THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXIX. No. 2184.] LONDON, MARCH 21, 1905. [57TH YEAR. PRICE 6d.

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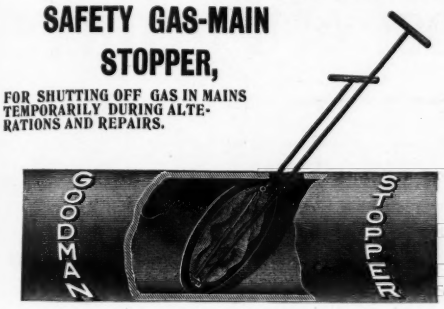

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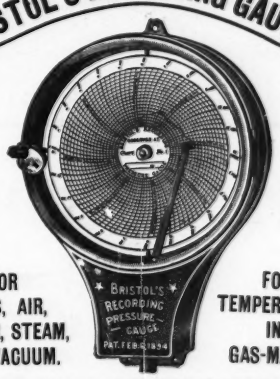

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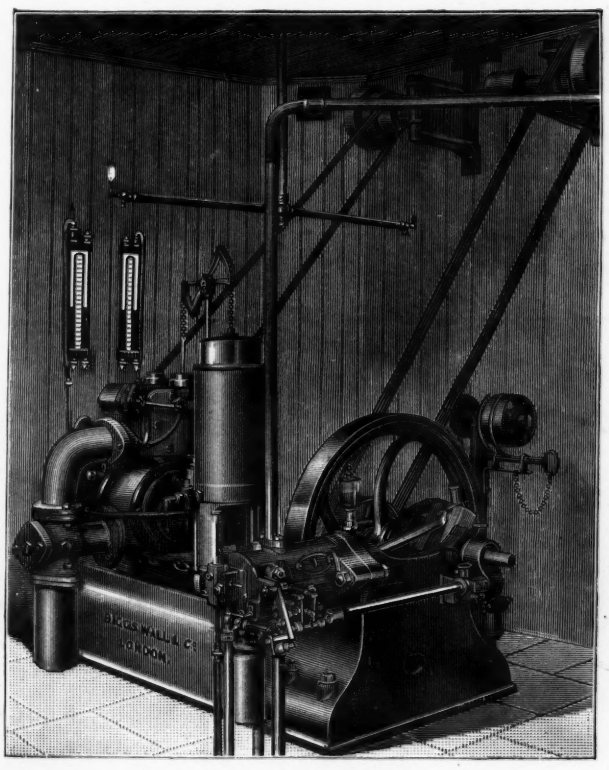

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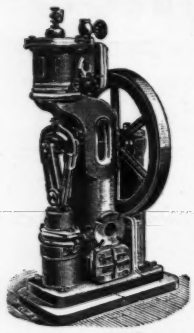

Fig. 705. "SINGLE RAM" STEAM-PUMP.

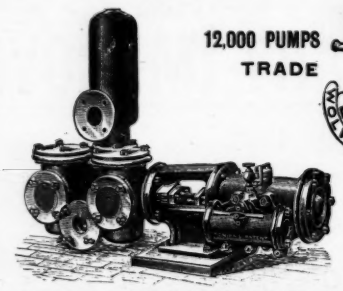

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

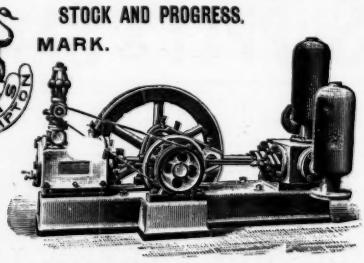

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

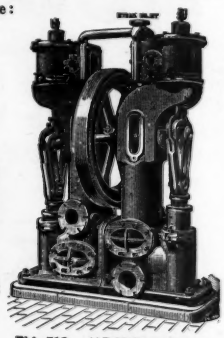

Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

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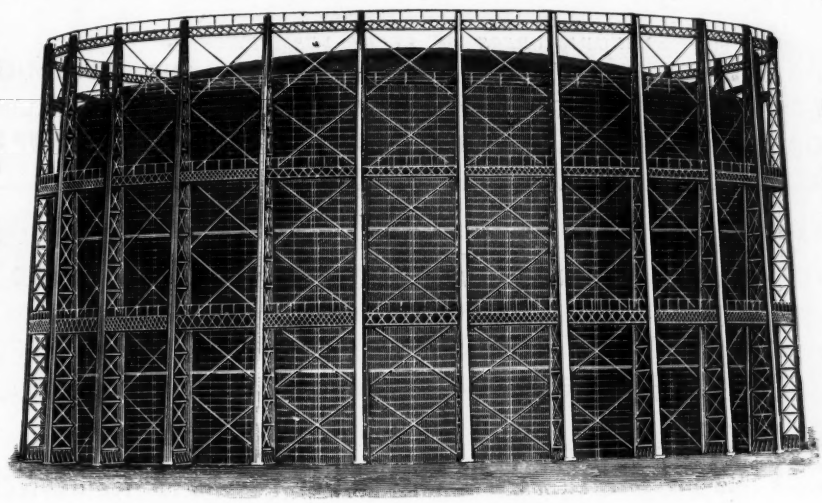

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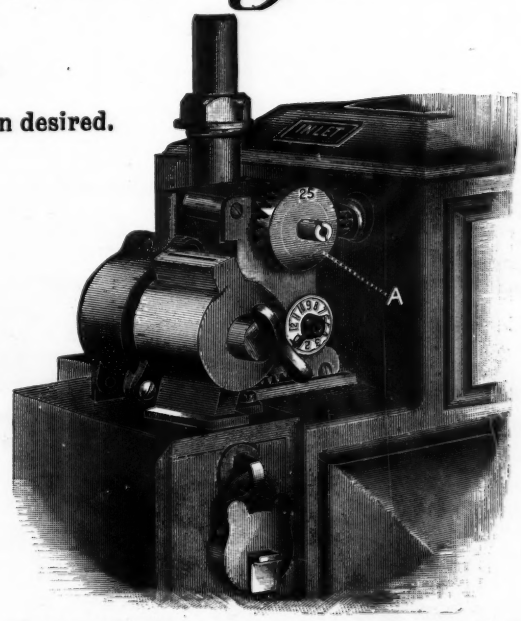

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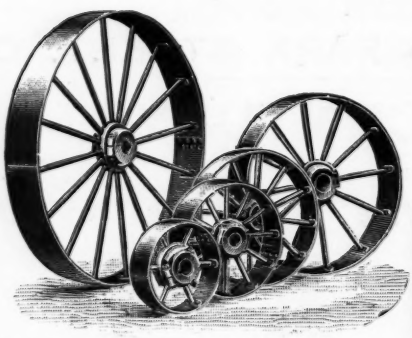

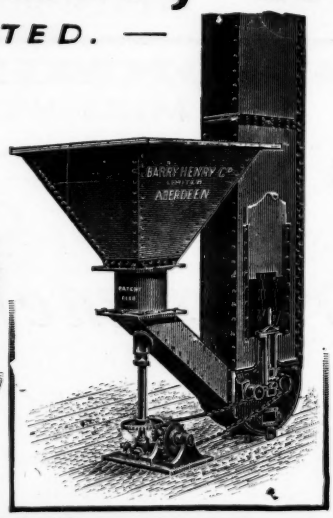

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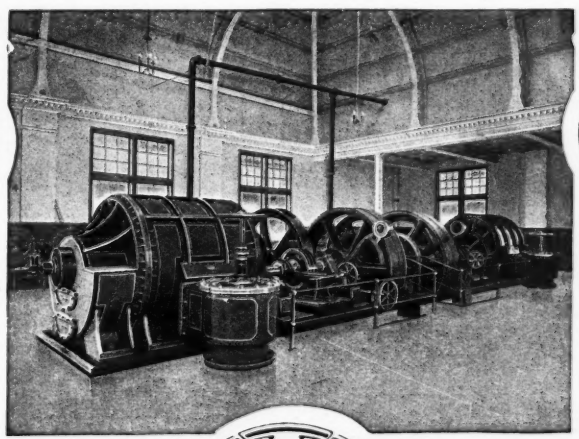

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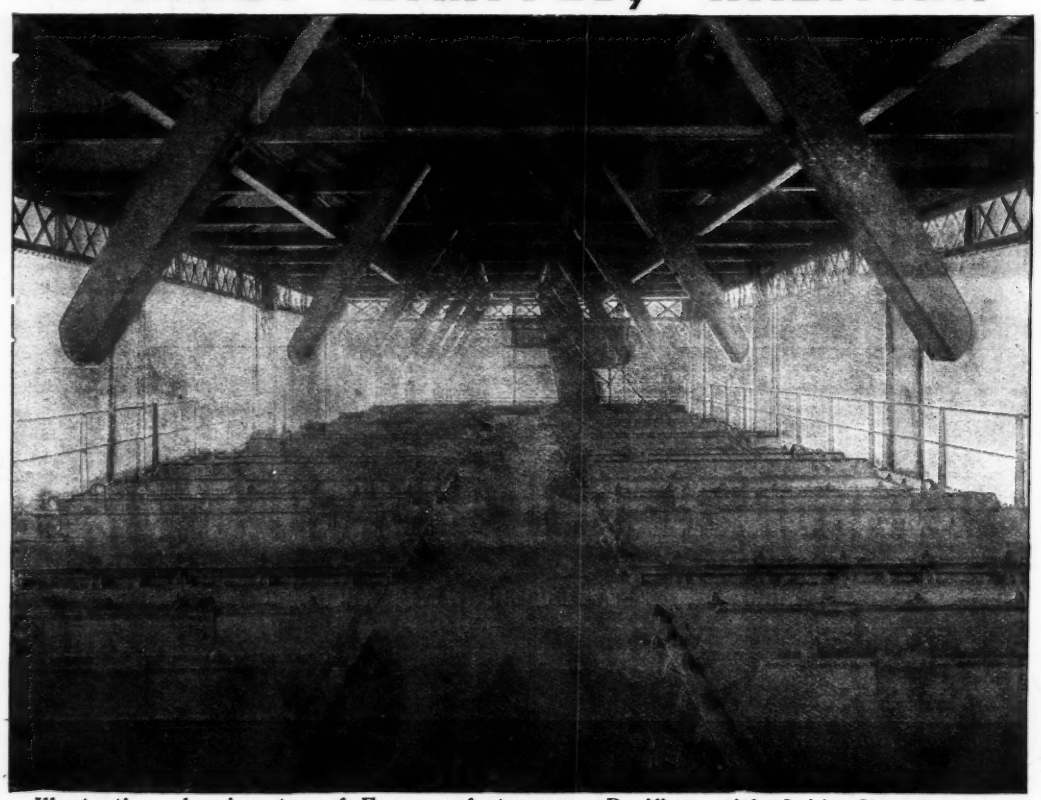

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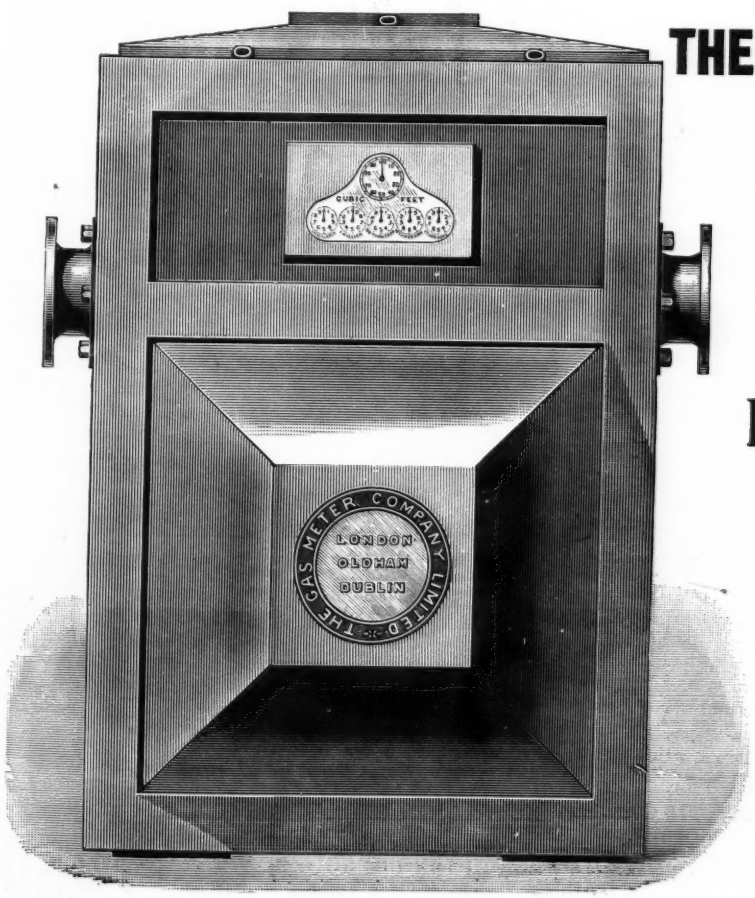

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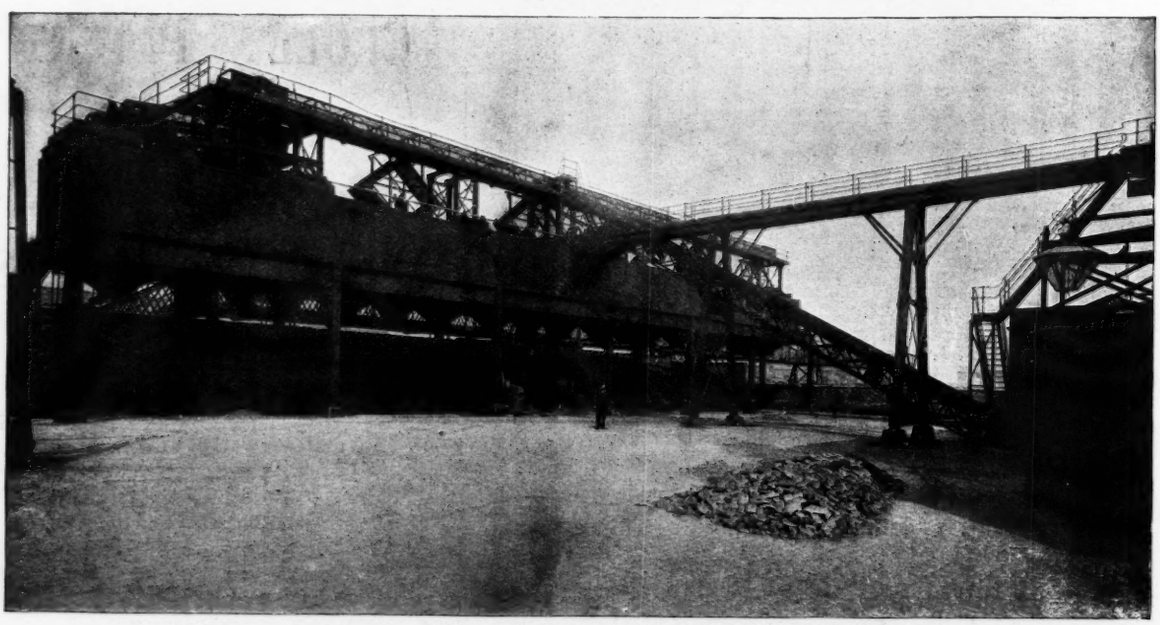

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VOL. LXXXIX., No. 2184.—TUESDAY, MARCH 21, 1905.

EDITORIAL NOTES—GAS, &c.

The Institution of Gas Engineers and Gas Testing.

WE are enabled to publish to-day the full text of the memorial on the subject of gas testing, to which reference has already been made in these columns, which was sent by the Council of the Institution of Gas Engineers in November last to the Board of Trade, together with the latter's acknowledgment of it. Such action on the part of the Council was made practically inevitable by the strong and unanimous protest, passed at the meeting of the Institution last June, against the recommendation of the Departmental Committee of the Board that the 5 cubic feet rate of consumption should be reverted to when testing gas of a lower quality than 16 candles. As stated in the memorial, this is a proposal "that affects the entire gas industry, since the method "of testing employed in the Metropolis is usually followed "elsewhere." It is not too much to say that this portion of the Departmental Committee's report was read with feelings of dismay and disappointment; for gas makers had been cherishing the hope and belief that at the very least the forward movement in this respect of the South Metropolitan Gas Company would have been emphatically endorsed, and a seal placed upon a system of testing which does much greater justice to the lower qualities of gas than the 5 cubic feet rate of consumption, and gives, practically speaking, comparable results. It was, indeed, felt by all that, whatever the method decided upon, it was almost certain to be one by which the depreciating effect of the burner would be avoided as far as possible, and the illuminating power of the gas determined in stricter accordance with its illuminating value. It is understood, as a matter of course, that no question of obtaining the full illuminating power of the gas was involved; for this is acknowledged to be an impossibility. The question at issue was merely one of definition, but of definition, it is important to bear in mind, in relation to some other quality of gas already clearly defined—namely, gas having an illuminating power, under the recognized conditions of testing, of 16 candles. This is a point which has, unfortunately, been too much lost sight of by the advocates of a 5-feet rate of consumption for all qualities of gas, who attach importance to an appearance of uniformity in the method of testing, rather than to the comparability of results. They are indifferent to the fact that gas which, if tested at the 5-feet rate, appears to be only 13-candle gas, is in reality only 2 candles inferior in illuminating value to 16-candle gas. The gas maker who supplies this lower quality cannot, however, afford to be thus indifferent, because in any comparison of working results he is placed at a decided disadvantage. It is the grave injustice which is thus perpetrated by the 5-feet rate of consumption which the gas industry now desires to see remedied; and no return to it will or can be regarded with satisfaction or even equanimity. It will certainly not be accepted as a settlement of the question; and if the views of the reactionaries should unfortunately prevail in the present inquiry, the agitation is certain to be renewed again and again until justice is done, or tests for illuminating power are discarded.

Mr. Vernon Harcourt, when giving evidence last year before the Board of Trade Committee, said that it was to be regretted that the South Metropolitan Company's Act should have altered the meaning of the term "fourteen "candles," which had existed since the year 1868. But why, it may be asked, should this be a matter for regret, if the new definition of such gas be more accurate than the old one in its relation to what is known as 16-candle gas? Is it not the fact that it corresponds much more nearly than the old definition with the amount of illuminating constituents that would require to be added in order to bring up the illuminating power to 16 candles? It is certainly true that the old definition, which Mr. Harcourt appears to regard as having been hallowed by time, continued to be employed in connection with many Provincial Gas Acts until a very recent period; but that is only because no one had been found with sufficient courage to attack it. For a long time, however, prior to the passing of the South Metropolitan Company's Act, it had been felt that injustice was being done to the lower qualities of gas by the 5-feet rate; but so long as illuminating value was of importance for its own sake, there was not a great deal to be said in favour of a change. The introduction of incandescent gas lighting, however, completely altered the situation, and illuminating power soon came to be regarded as an index to calorific rather than to illuminating value. It was not, therefore, at all surprising that the South Metropolitan Company's Act was speedily recognized as having initiated a much-needed reform; and had its provisions as to testing for illuminating power been extended to the Commercial Gas Company (also supplying 14-candle gas), all would have been well. What, then, is the issue to-day, and was the subject of the costly parliamentary contest last week? Is it merely as to whether the 14-candle gas supplied by these two Companies shall henceforth be called 14 or 13 candle? So far as the London County Council are concerned, the answer must be in the affirmative; and it would greatly puzzle them to say how their constituents, the consumers, are in the least likely to be benefited, whatever may be the decision of the Select Committee.

On this particular point, the London County Council are going "bald-headed" for the recommendation of the Board of Trade Departmental Committee—and to all appearances with no other object in sight than to be enabled to alter the definition of the gas now supplied by the South Metropolitan and Commercial Companies. The Counsel for their Bill, Sir Ralph Littler, in advocating its adoption, laid stress upon the composition of the Board of Trade Committee, and assumed that the gas industry was represented upon it by Mr. William King. That assumption, however, was not warranted. The gas industry was not consulted as to the choice of a representative. Had it been, the choice would most certainly not have fallen upon one who, though deservedly esteemed and respected by his gas *confrères*, has never shown himself to be in sympathy with their aspirations. It was felt, at the time of his appointment—and the feeling has since been accentuated—that one who was less representative it could hardly have been possible to select. It is doing no injustice to Mr. King to say that in gas matters he is an ultra-conservative, and opposed to such innovations as the sliding-scale, low-grade gas, or canvassing for consumers, all of which form an important part of the creed of the progressive gas maker.

To the Companies, however, the question which is before the Select Committee means much more than a mere change of definition. They are liable to penalty for default of illuminating power; and it behoves them to see that the method which may be adopted for testing is the fairest that can be devised to suit all the circumstances that are likely to occur. In this view it may be pointed out that the Board of Trade Committee do not appear to have appreciated the fact that identification of illuminating power becomes increasingly difficult with a reduction of quality; one reason being that low-grade gas suffers more from barometrical changes, if tested at the 5-feet rate of consumption, than does gas of a higher quality, because at such rate for all gases the air supply remains practically constant. The evidence given by Mr. W. J. Dibdin last week was new, and is highly valuable in this respect—that it indicates for the first time, by actual experiment, the great variations that may occur in testing the same gas if of low quality, and also that such variations increase in extent with every reduction of quality. It would be a grave injustice to the

Gas Companies if any method of testing were to be imposed upon them that would render them liable to penalties for variations over which they have absolutely no control; and it is impossible to believe such injustice will be permitted.

If the Council of the Institution of Gas Engineers had simply had to determine for or against the provisions of the South Metropolitan Company's Act of 1900, their task would have been an exceedingly simple one. These, however, had in effect been thrown aside by the recommendations of the Board of Trade Committee; and therefore it was open to them to consider the whole matter afresh, in the light of recent developments—notably the general adoption of a mixture of coal and carburetted water gas, which requires less air for combustion than coal gas alone. The memorial to the Board of Trade is the outcome of their deliberations and inquiries; and it is a document which is thoroughly worthy of them. It explains the position with lucidity and force, and may be said to carry conviction with it. It practically commences with the enunciation of a proposition that is but a corollary of section 43 of the City of London Gas Act, 1868, which provided that the burner to be used for testing the illuminating power is to be "such as shall be the "most suitable for obtaining from the gas the greatest amount "of light, and be practicable for use by the consumer." The memorial goes but a step further when it says that, in testing the illuminating power of the gas, the principle is to be observed of "burning the gas at such height of flame as will "best develop the maximum efficiency of the gas in the "standard burner used for the time being."

Keeping this principle in view, the Council have arrived at the conclusion that the most satisfactory method of testing would be by the employment of a fixed height of flame in the chimney—such fixed height to be 3½ inches—to suit the circumstances alike of the makers of coal gas alone, and of those of a mixture of coal gas and carburetted water gas. Such is, in effect, the sum and substance of their recommendation; and there will be a general concurrence with the opinion they express that this "would afford the means "of comparing, on practically equal terms, gas of varying "qualities made in any part of the kingdom; and it would, "consequently, be a definite and satisfactory settlement of "this much-vexed question." Whether any action has been or will be taken by the Board of Trade with regard to this memorial, is not known. They, at all events, have had in their possession for some months the views of the gas industry upon the question that is now before Parliament; and an opinion as authoritative as any which could be furnished as to the best way of settling it—not for London only, but for the whole of the country. We would therefore venture to urge on the Board of Trade, with all due respect, the desirability—not to say the necessity—of bringing this memorial to the notice of the Select Committee which has under consideration the Bills relating to the Metropolis Gas Supply.

The London Gas Bills in Parliament.

THE proceedings on the London Gas Bills began on Thursday last with the measure promoted by the London County Council; but, at the close of the sitting of Mr. Cawley's Committee on Friday, there was no indication as to what is likely to be their determination on the single point that had been under discussion before them during the two days. This is the most difficult problem of all that faces the Committee in respect of the measures that deal with the supply of gas in the Metropolitan area, and it is what is to be the future mode of testing gas of an illuminating power below 16 candles—whether or not the rate of consumption is to be fixed, in accordance with the report of the Departmental Committee, at 5 cubic feet in a burner that was never intended for gas of a lower illuminating power than 16 candles. The anomalous condition of things created by the report of the Departmental Committee serves well the obscurants of Spring Gardens in their wild antipathy to the London Gas Companies—more probably than not intensified now because they are heavily financially interested in electricity supply. The Departmental Committee avow the injustice of the test they themselves would apply, by conceding that 14-candle gas returned as 13 candles under their proposed system should be allowed to comply with the statutory requirement. But if there was one thing that the evidence of scientific men and photometrists of the highest standing last week confirmed, it is the knowledge that most people possessed, from those of advanced experience down to those with only a rudimentary acquaintance with the subject of the photometry of gas lighting, that the concession made by the Departmental Committee, while in itself falsely denominating the gas in a manner totally unacceptable to the Gas Companies as purveyors, does not really envelop or provide for the ultimate injustice that the legalization of their method would impose upon the Companies. The point has been made abundantly clear to the Committee by the tests of Mr. Dibdin, the evidence of Sir George Livesey, Sir William Ramsay, Sir James Dewar, Mr. Otto Hehner, Dr. Samuel Rideal, and Mr. T. Goulden, and last, but by no means least, by the evidence of the County Council's own official adviser—Professor Frank Clowes. He admits that the fixed 5 cubic feet rate will not give the "best value" to the 14-candle gas, while it does do so to the 16-candle gas; but he wants uniformity in system so as to secure relative results. Nonsense! Did ever scientific man go into the witness chair with more illogical argument? How is it possible for "relative results" to be obtained when to the 16-candle gas consumed in the No. 1 "London" argand at the 5 cubic feet rate the "best value" is given, while the "best value" is not given to a gas, consumed in like manner, of a lower candle power? The point is so absurdly clear that it is not astonishing that, though the Committee admitted their inability to appreciate the whole of the technicalities, they recognized that the Companies had a grievance.

It is the testing proposal in its fullness of the Departmental Committee that the London County Council are endeavouring to obtain statutory power to inflict upon the Metropolitan Gas Companies supplying gas of lower illuminating power than 14 candles; and it follows upon all those Companies who last session agreed in their Acts to conform to any recommendation as to testing made by the Departmental Committee, or to such other method as should eventually become the statutory one for the Metropolis, and upon all Gas Companies who may apply for authority to supply a lower quality in future. It will be seen from this that the issue is not merely a Metropolitan one. The London Companies, on their part, have unanimously put forward as an alternative to the Departmental Committee's recommendation the 3½-inch flame clause; or (we believe it may be said) they would prefer to be left with the South Metropolitan method of honestly treating the gas by consuming it at such a rate as shall produce, with the lower quality gas, a 16-candle flame, and calculating back to the 5 cubic feet rate. Sir William Ramsay put forward the further suggestion that for 14-candle gas the rate of consumption should be prescribed at 5·7 cubic feet, which is in effect merely giving definition to the South Metropolitan and Commercial Gas Companies' present authorized procedure in the matter of testing. It is not by any means a suggestion that is remarkable for freshness; but it unquestionably made an impression. The Committee have almost conclusively stated that they cannot accept, in substitution of the Departmental Committee's proposal, the Companies' 3½-inch flame clause, which they regard as too highly scientific for their determination. Practically, then, they have before them for testing 14-candle gas the unfair method of the County Council and Departmental Committee, Sir William Ramsay's 5·7 cubic feet rate, or the rejection of both, and leaving the Companies with their present mode of doing all that the County Council desire—that is, ascertaining the proper relative value of the respective gases supplied in London.

One of the most pleasurable features of this contest is that the London Companies—the Gaslight and Coke, the South Metropolitan, and the Commercial Companies—have recognized their responsibility in this matter not only to themselves, but to the whole gas industry, and have conjointly attempted the destruction of this unjust and mistaken recommendation of the Departmental Committee and the machinations of the London County Council. Faced by the Departmental Committee's report, their task has been a very stubborn one. Whether they have succeeded in it remains to be seen until other questions have been discussed. If peradventure they have not, the accusation cannot lie against them that they have not taken every conceivable step to achieve their end, by bringing to their aid the most eminent of scientists to prove the threatened obstruction and injury to a great industry. The question of injustice is the real issue before the Committee; and to all excepting the prejudiced and the uninitiated it is palpable. We must admit the difficulty of the Committee. They point to the reference of the matter from Parliament to a scientific Committee

because Parliament was unqualified to judge; and now to them, equally technically unqualified to judge, are referred for decision the rights and wrongs of the recommendation of the scientific Committee. But it is something gained to have an acknowledgment that it appears to them the Companies have a grievance. That being so, it is for Parliament to extinguish, and not to perpetuate, it.

The proceedings yesterday practically settled both the London County Council Bill and the one promoted jointly by the three Companies. The two, of course, ran on somewhat similar lines in many respects; and it was merely a question on most points of obtaining a decision from the Committee adjusting the differences between the two. The Committee showed a disposition for clinging closely to the Departmental Committee's report. The question of testing still remains an open one; and it may be there will not be any declaration on this head until after the hearing of the South Suburban Bill. A notice of yesterday's proceedings appears on page 764.

The Financing of Technical Research.

MEMBERS of the Boards of Gas Companies and Corporation Gas Committees who have been to the trouble of reading the discussion which took place at the Southern Association meeting last Thursday week, upon the question of the disappointing response to the appeal for funds for prosecuting the well-advanced research into the subjugation of naphthalene, will have found—or anyway many of them, we hope, will have done so—their well-merited censure. The gas industry seems to have taken unto itself certain erroneous notions which time has cast into settled rules of action; and one of them is that "Generosity in financial assistance "begins and ends at home." We glory in the fact that at the end of 1903, the authorized gas supply undertakings in the United Kingdom totalled to 719, having an authorized capital of close upon £138,250,000, receipts amounting to £27,576,311, and gross profits reaching nearly £7,200,000. But we do not glory in the fact that, of these 719 undertakings, in that year 31 (20 of whom were companies, the rest corporation gas committees), with two companies at the Antipodes, managed to subscribe between them to the work of the Institution of Gas Engineers the magnificent sum of £70 12s.! Put this against the profits drawn from the supply of gas, and if it does not produce a feeling of shame, then the heart of the gas industry is indeed a hardened one. What delightfully choice epithets, what beautifully caustic and sarcastic sentences could be applied, if one were inclined, to such a condition of things. In the case of most gas administrators, their interest in the work of the gas industry appears to be disjuncted exactly at the line which marks the limits of their supply area. They do not recognize that the gas industry of which their undertakings form simply a unit has anything about it in the nature of a common interest; that outside their own undertakings and ministerial labours there is work of a technical nature to be done which can best be handled by a body rather than by individual experts; and that that work cannot be accomplished without financial support be rendered by those who ultimately benefit from it. Those directing gas undertakings are ever ready to enter into the enjoyment of the rewards of the progress effected by the laborious researches of others; but the measure of their willingness to assist in making possible the quest for improvement and the solution of vexing problems is pretty fairly represented by the £70 12s.

We will not essay an explanation of why there is this lack of support to the technical work of an industry in which there is so much to be constantly done, but so little that can be done—rich though the industry is—through the indigence in respect of available means of the technical organizations best fitted to carry on such work. But those managing the greater proportion of British gas undertakings never have been generous with funds for purposes outside those of their own concern. Their well-established rule is, "Get as much "as you possibly can for nothing; and on no account give "anything away that will not bring a direct return to our own "treasury." Diving into memory's store, we recollect on how few occasions the gas industry has been asked for contributions to any cause or for any purpose; and when they have been, how melancholy the result, considering the wealth of the industry. Go back to 1890, when much against his wishes a public testimonial was promoted to Sir (then Mr.) George Livesey as a mark of appreciation of his conduct during the then recent strike in South London, which did more than anything else could have done to break down the servitude of the gas industry to Trade Unionism. On that occasion 13,000 circulars were distributed; and those circulars produced 1450 subscribers, who managed to contribute between them £2216—the portion of which that was handed to Sir George for his disposal being utilized by him to the advantage of others. Then when Sir George took measures to obtain greater freedom for the gas industry in respect of dealings in mantles, and invited those directing gas undertakings to aid the measures by financial support, at the time the settlement was achieved, and about £3000 had been spent, the subscriptions for the purpose fell sadly short of what was required, though the undertakings in which Sir George was more closely interested had borne the greater share of the burden. Again, the Gas Companies' Protection Association are hampered in taking upon themselves more vigorous and resolute action by nothing greater, and yet nothing more obstinately obstructive, than the want of money. The Southern Association have got a long way into their investigation into the sorely perplexing question of naphthalene, the difficulties produced by which have cost hundreds of gas undertakings individually more money than will be the whole cost of this investigation. Yet there are—at the very point where success appears to be within reach—doubts as to where the funds are coming from to finish the inquiry. Time after time experimental gas-works have been asked for; they are apparently buried as far beyond actuality as ever. The Council of the Institution of Gas Engineers have a Sub-Committee considering the question of the Institution appointing a Technical Research Committee; but the Institution have no funds for the purpose, whatever the recommendation. The balance between their income and expenditure, under the circumstances of 1903, was only £59 3s. 6d.; and even were the Institution to deplete their little accumulated financial stand-by for the purpose of investigation, it would not go far. It is not right that the officers of the gas industry should be expected to bear the expense in money as well as labour of technical research that unquestionably benefits more the undertakings which they serve than themselves. The only fairly satisfactory appeal for funds that has been made in the gas industry was for the recent exhibition; but before an adequate fund was established, an amount of whipping-up had to be resorted to which was almost disheartening.

The neglect of gas undertakings to succour technical work is equally fashionable in America. It is calculated by Mr. Henry L. Doherty that the aggregate amount of revenue of all the Gas Associations in North America is only about $12,000, but (this should be taken to heart by the gas industry) other industries receive more liberal support for their Association work. As an example, the American Institution of Electrical Engineers have a revenue in excess of $35,000 a year, the National Electric Light Association have a revenue of practically $20,000 a year, and even the Edison Association (with but 82 members) have a greater revenue than the entire aggregate amount of revenues available to the Gas Associations of North America. We do not like forcing Germany upon the attention of our readers in this connection; but how can we avoid it, when it is seen that they have far less difficulty there in amassing funds for technical inquiry? At the last meeting of the German Association of Gas and Water-Works Engineers, report after report was presented by Committees to whom had been referred certain questions; and as each Committee with uncompleted work came forward, they were voted further funds for the pursuit of their inquiries. The Committee on Electrolysis, for instance, were allowed an additional 6000 marks for continuing their work. Our own Institution would have their coffers exhausted at one sitting by emulating what was done by their German brethren at their last meeting. The German Association, too, are considering a scheme for the erection of experimental gas-works, at a cost of 70,000 marks. The members of our own Institution dare not contemplate such a thing, because those in superior control of the gas undertakings (which would reap the advantage) do not offer the Institution the slightest encouragement to serve the industry, beyond what can be accomplished by the membership subscriptions.

If there has been any time in the history of the industry when greater need has existed than the present for the

widest possible liberty being given to technical research, we have no knowledge of it. We ask for that liberty being granted by gas undertakings generally, for something more substantial than sympathy and best wishes being accorded the willing and sedulous labourers of the industry, and for the recognition by those who draw their profits from the industry of their responsibility in contributing to its progress by furnishing the means which will enable the work of exploration to go forward—to, it must be, valuable ends.

Naphthalene Treatment at Leicester and its Results.

At a special meeting of the Leicester Town Council last Tuesday to consider the budget, the Chairman of the Gas and Electricity Committee (Mr. Edwards) laid before the Council, in a report from the Committee, the financial position and general progress of the two undertakings of which he and his colleagues have charge; and in another part of the present issue we give some comparative figures in regard to the one in which our readers are specially interested, and a report of the remarks made by various councillors thereon. Though the income from the sale of gas was lower last half year than in 1903, owing to industrial depression, and there was likewise a drop in the revenue from residuals, there were happily some compensating decreases in expenditure. Coals cost considerably less; the charges for the repair and maintenance of plant were nearly £2000 lower; while distribution had been carried on with a saving of £3259. Rates and taxes, however, went up £1630, attributable to the rise in the income-tax. On the whole, the Committee had the substantial profit of more than £49,000 to show as the result of the past year's work. How had it been done? Not by obtaining an increased price for the residuals, as certain wiseacres tried to make out in some of the local papers, but, as Mr. Edwards told the Council, by "splendid management, the loyal staff, and excellent workmanship." He said the whole of the employees, from Mr. Alfred Colson, the Engineer and Manager, down to ordinary workmen, deserved the hearty congratulations of the Council. But their efforts were furthered by a valuable auxiliary in Mr. Colson's naphthalene process, by the adoption of which, he said, a large proportion of the profit had been obtained. Not only had the £2000 previously spent in removing naphthalene obstructions in the town been saved, but an increased make of gas per ton of coal had been possible, owing to the higher temperature at which carbonization could be carried on. He added that he thought the Council should be thankful that they had such a man as Mr. Colson in their service. We refer to this matter with a certain amount of gratification, because the publication of the particulars in regard to the Leicester process in our columns last October was followed by correspondence which revealed the existence of a feeling that too much importance was being attached by us to Mr. Colson's discovery. We distinctly disclaimed any predilection for this process, and merely recorded the results obtained. That these have been beneficial, technically and financially, to Leicester, the proceedings reported elsewhere conclusively prove.

Street-Box Explosions.

It is a pity when official statements are made as to street-box explosions in which gas of one kind or another and electricity are jointly concerned, that the information does not include, whenever possible, some indication as to the source whence the gas came, because—the mistake is quite natural—the public at once jump to the conclusion that vagrant coal-gas is at the bottom of the trouble. So many of us thought for long, until the secret leaked out that some of the compositions used for coating electricity wires and cables were, by the aid of the electrical current capable of giving off an explosive gas. What are we to make of the reply that Mr. Akers-Douglas gave to a question on this subject by Sir Thomas Dewar in the House of Commons on Monday last week? It leaves us absolutely in the dark as to the character of the gas referred to. During the three years ending December 31 last, the Metropolitan Police, he stated, reported six explosions as having been caused by gas escaping into telegraph inspection chambers, and coming into contact with a leakage from an electric light wire; and there was a seventh case of an explosion in a similar chamber, in which it was supposed that a lighted match caused the ignition of the gas. Further, there were 23 similar explosions through the accumulation of gas in electric-supply boxes. Of course, the Police cannot fairly be expected to know anything about the character of the gas; but inquiries might have assisted in making the answer more complete. It may be that some of these accidents were due to coal gas; it is just as likely that many of them were due to the gas-generating capacity of some forms of electricity cables. This we do know, that if certain explosions which occurred not long since in one of the London electricity distribution systems are included in the above figures, it is admitted that in them coal gas had no part. But, however the gas got into the boxes, whether from internal or external causes, the responsibility as between gas and electricity for the resulting explosion is equally divided, seeing that the latter fired the gas. Also, spread over the three years, the total number of the explosions is not great; but it is one of that class of occurrences of which the less we have the better. It is a little disconcerting to those wayfarers who hear of these things not to know where or when the next lid is going to be lifted by invisible means.

A Case in Court.

That there are instances in which coal gas finds entrance to electric light and telephone boxes, and contributes to explosions, no one, of course, is prepared to deny—the point contended for is that coal gas is not the universal explosive, accountable for all these accidents. There was a case before Mr. Justice Darling and a Special Jury in the King's Bench Division last week, in which little doubt exists that an accumulation of coal gas in telephone boxes in the neighbourhood of Glasshouse Street did produce—through it seems to us, with all deference to the jury, the negligence rather of Post Office telephone men than of the Gaslight and Coke Company—an explosion, among the effects of which was the injury of a Miss Ogden and a Mr. Smith. These two were the plaintiffs in an action to recover damages from the Gaslight and Coke Company; and the only question was one of liability—the amount of the damages, if the Company were declared liable, having been agreed. Complaint had been made of a smell of gas in the neighbourhood; but the evidence was abundant that the Company had abortively made every possible endeavour to trace the leakage. On the other hand, the jointer of the Post Office telephone department who applied the light which caused the explosion admitted that, on lifting the cover of the box at which he was working, he detected gas, but he did not (before applying the light) remove the next cover to ensure the ventilation of the telephone cable conduit. Moreover, the Board of Trade regulations for the public safety in connection with electrical enterprises specify that reasonable means shall be taken by the undertakers to prevent an accumulation of gas in such receptacles as these. But we have Mr. W. Noble, Assistant Superintending Engineer to the Post Office Central London District, averring there is no further precaution taken in these footway boxes than that they are not hermetically sealed; and his experience of electric lighting boxes is that they are not impervious, and there is no attempt to make them so. The recurring accumulation of gas shows that the Post Office had taken no reasonable steps to prevent it; and the direction of Mr. Justice Darling to the jury, together with his remarks after the verdict as to these boxes being ventilated in order that the public might be protected, rather suggests that his Lordship's views on the question of the shoulders on which the liability should rest hardly coincided with those of the jury. However, the jury gave a verdict for the plaintiffs; but we hope this does not finally dispose of the matter. The case is of such importance to gas suppliers generally that it will be a pity if it is left in its present unsatisfactory position. And of all gas suppliers, perhaps there is no other with a district so thickly strewn with underground chambers of the kind in question as the Gaslight and Coke Company. Therefore, apart from what is involved in the present case, they have the greatest interest in it in regard to its bearing upon future responsibility.

Shareholders' Criticism.

A fortnight since the question was discussed in our editorial columns as to what was fair and admissible criticism on the part of shareholders at Company meetings; the question having been raised by comment on a question of policy by Mr. J. H. Brown at the meeting of the West Ham Gas Company. It was laid down as an acceptable principle that all matters affecting the general interests of a Company, providing those interests were not jeopardized by the criticism, could be fairly discussed. We must

amend that by also excluding matters which affect, directly or by inference, personal probity, unless the assertion or insinuation can be sustained by actual proof. A correspondent who had read the article on "Shareholders' Criticism" submits to us for an opinion the question as to whether a suggestion of this kind is considered a fair one for a shareholder, and an ex-gas manager, to make at a meeting of a company. "I would suggest," the shareholder said in effect, "that the chairman and directors should be instructed to see that all the gas made is registered, and that the bye-pass of the station meter is not tampered with; and, further, that the same be sealed." The suggestion is put in equivocal language, but the innuendo is perfectly clear; and deliberately we say that no shareholder, whatever his purpose, has any right to advance a suggestion of this kind at a meeting of his fellow-shareholders without full explanation, or proof positive in his possession that he can justify the insinuation. If truth underlies the statement, then it should have been couched in plainer terms; if it was only put forward, without certain knowledge, for the purpose of injury, then the act was a despicable one. We can say no more, for our knowledge of the matter does not exceed the communication of our correspondent. What but a dishonest object is to be served by a manager or those under him in bye-passing the station meter under ordinary circumstances, we fail to see; and we deem all men honest until proof that they are otherwise is forthcoming. Insinuation of a personal nature, to say the least, is not a manly weapon.

Cheap Gas.

Among the Gas Company Chairmen from whom assembled shareholders always expect to hear something of interest beyond the confines of their particular undertaking is, Sir Frederick Mappin, M.P., of Sheffield fame; and his inability, owing to indisposition, to be present at the recent half-yearly meeting must have caused keen disappointment to the proprietors. And not to them alone. Sir Frederick himself must have very greatly regretted his enforced absence on an occasion when there was such particularly pleasant matter to dwell upon as was the case on this occasion. Twelve months ago—that is to say, at the beginning of 1904—the Company made a reduction in the price of gas of 2d. per 1000 cubic feet; but in spite of this fact the profit realized on the last six months of the year was practically £10,000 more than was required for the payment of the dividend. As the reserve fund is full, this sum goes to swell the previous unappropriated balances, making a total of over £70,000 in hand. In view of this result, it is easy to understand the determination of the Board (announced some few weeks ago) to still further lower the price of gas. As from the end of the present month, another 2d. per 1000 cubic feet is to be taken off, which will make the charges 1s. 6d., 1s. 4d., and 1s. 2d., according to quantity; and this is an achievement on which both the Company and the consumers are to be congratulated. At the meeting, Mr. Wilson Mappin, who presided, remarked with some pride that when this reduction took effect Sheffield would enjoy "the lowest price charged for gas in England;" but this statement has not been allowed to pass unchallenged by Mr. Isaac Carr, who, in a letter to one of the local papers, points out that the present prices in Widnes, which have obtained since 1903, are 1s. 4d., 1s. 2d., and 1s. per 1000 cubic feet. Mr. Carr is naturally somewhat jealous of the reputation he has earned for Widnes; and while willing to concede that Sheffield enjoys the premier position among the Companies in respect to price, he still claims for his Corporation the proud position of being suppliers of gas at a less price than that "of any gas company or public authority in the world." But perhaps in neither instance has finality yet been reached. In Sheffield, the last four years have witnessed four reductions in price, the amount on each occasion being 2d., and the total representing a rebate of no less than 30·77 per cent. The consumers therefore are hardly likely to despair of receiving other similar favours in the future. Then as to Mr. Carr, he too has already done so much that his fellow townsmen will certainly hope to see him do still more.

A Miracle at Dublin.

There has been great jubilation in the Finance and Electric Lighting Committees of the Dublin Corporation, and much congratulatory handshaking, over what appears to be the fact that the Electric Lighting Department of the city is showing signs of mending its ways, and that at the end of the current financial year, it is believed fully and sincerely by the powers that be, the concern, instead of having to claim rate-support, will show a balance on the right side. But the change from the bad to the regenerate state is so sudden that we may be forgiven in expressing a preference for waiting until the accounts for the year are issued before joining in the acclamation. Year after year the ratepayers (of whom the gas consumers form a considerable proportion) have had to subscribe thousands of pounds in meeting the deficiencies of the concern; and therefore when a statement was made on the subject of the good news at the meeting of the Council on Wednesday, that there was a note or two uttered by doubting Thomases is not to be marvelled at. Not only is the department proclaimed as self-supporting, but there is a reduction in price—notably for power purposes—promised; and provision, it is announced with pride, has also been made in the estimates for an additional capital expenditure of £20,000. It was only the other day that the Local Government Board for Ireland were, as the result of an inquiry (which raised in their minds much concern for the ratepayers of the city), sermonizing the Corporation on the matter of the losses on the undertaking. What better reply could the Corporation have for the Local Government Board than the news that the "corner has been turned?" though it has been a weary thing pushing this cumbersome concern along to the corner. However, before too much congratulation flows over this changed condition of things, it will be well to see what the accounts say, at the close of the year. We are afraid that their examination will not yet disclose much over which to crow. Parliament has awakened to the fact that electrical plant often wears out before loans are repaid, and that this is not provided for by depreciation; and, in the first case before a Committee this session, they have shortened the period for repayment. The Electric Lighting Committee boast of having made provision for all sorts of things in their estimates. We wonder whether depreciation is included; also whether the heavy burden of public lighting, amounting to several thousands of pounds over what was formerly paid the Gas Company, is to be lightened. If the Dublin electric lighting undertaking has thus suddenly surmounted all its troubles, and a sound financial position is assured now and (so far as human eye can see) for ever more, then the days of miracles have not passed. Incidentally we learn from the report of the Council proceedings that the Gas Company have not "put up the shutters," but are energetically pursuing their business. One councillor has heard of two cases where they have displaced the electric light; and there are no doubt others of which he has not heard.

Amending the Workmen's Compensation Act.

Following upon the issue of the report by the Home Office Departmental Committee which was appointed in 1903 to ascertain what amendments in the existing law relating to workmen's compensation were necessary or desirable, and to what classes of employment not now included the Acts could be extended with or without modification, a Private Bill dealing with the matter has been presented to Parliament by Mr. Shackelton. It is supported by Mr. Arthur Henderson, Mr. Bell, Mr. Crooks, Mr. John Johnson, Mr. Burns, Mr. Thomas Richards, and Mr. William Abraham; and its effect, in the event of its becoming law, would be to considerably increase the burden of employers. Under the existing Acts, a workman is not entitled to compensation in respect of injury which incapacitates him for less than a fortnight, while in any case payments are only made as from the beginning of the third week; and in spite of the conclusion of the Departmental Committee that there are no sufficient reasons for the transference to the employer of the burden of compensation for the whole or any part of the first two weeks, the present Bill provides that compensation shall be payable from the date on which the accident occurs. The next clause would, at all events, have the effect of reducing litigation, for it stipulates that, in connection with a claim by anyone for compensation for personal injury arising out of and in the course of his employment, "it shall not be competent for his employer to set up contributory negligence or any other defence in such proceedings." Then the Departmental Committee saw no grounds for any interference with the present system of so-called "contracting-out" schemes, much less for their abolition, and recommended that the provisions relating to them should remain substantially unaltered. This, however, is clearly not the opinion of the framers of the

Bill, for they include a provision against contracting-out, to the effect that any agreement whereby a workman relinquishes his right to compensation shall not, if made before the accrual of the right, constitute a defence to any action brought. The following scale of compensation is sought to be fixed: Where death results from injury, whether the workman leaves dependents wholly, partly, or at all dependent on him, his legal representative shall be entitled to 156 times the full weekly wages of a man in the same grade of employment in the same works, or £150, whichever is the larger, but not exceeding in any case £300. Where total or partial incapacity for work results, a weekly payment shall be made to the workman during incapacity of not less than 50 per cent. based upon the full weekly wages of persons in the same grade of employment in the same works, to be estimated in the same manner as in the case of death. Among the other provisions of this somewhat extensive Bill is one that, if in consequence of injury a man obtains employment at less wages than previously, he shall as compensation be entitled to the full difference between the two amounts; and "where an insurance company refuse to insure any class of workman who has been partially disabled, the injury shall be deemed a permanent disablement." Seamen are to be included among those whom the Bill seeks to benefit. It may be mentioned that the Government measure dealing with the same subject has not yet been printed.

The Future of the Society of Arts.

The intimate connection which has subsisted for many years between the Society of Arts and the technical side of the great industry of gas supply, justifies reference to a scheme which has been formulated for effecting an important change in its constitution. According to a statement published in "The Times" and other London papers early last week, negotiations are in active progress for the amalgamation of the Society with the London Institution; and the union of the two organizations only awaits the approval of the general body of the members. One of the reasons for the change will probably cause surprise to many of our readers. It appears that the house in the Adelphi, which was built by the Brothers Adam, after whom the locality is named, in 1775, is not the Society's freehold. The original lease expired in 1867, and was renewed for thirty years, and subsequently for a further period of seven years. The Society are consequently now practically the tenants-at-will of the freeholder. The London Institution, on the other hand, possess large freehold premises in Finsbury Circus; but, owing to the changed conditions of City life, the facilities they afford for study and recreation are not taken advantage of so fully as of old. It is therefore proposed to carry on the work of the two bodies in a new home within reach of the West-End—possibly on some of the land now vacant as the result of the Strand improvement scheme. Here would be located the valuable library of the Institution; and in the new theatre the lectures which are a feature of both bodies would proceed much as before. The severance of the connection of the Society of Arts with the old house in Adam Street will not be made without a feeling of regret by possibly not a few members of the gas profession; for it was there that from 1868 to 1878 the London meetings of the British Association of Gas Managers were regularly held, and where many instructive lectures have been given from time to time, by Professor Lewes and his predecessors, on the manufacture and utilization of gas. Circumstances, however, have necessitated a removal; and, this being so, all that can be done is to express the hope that the amalgamation of the two societies may afford wider scope for the development of the objects which for so many years each has striven to attain.

Property to the gross value of £149,358 has been left by Mr. Henry Ward, J.P., who was Chairman of the Wolverhampton Gas Company.

The late Mr. T. Fenwick, of Leeds, whose death, at the advanced age of 80, was recorded in the "JOURNAL" for the 17th of January, left estate valued at £55,700.

The petroleum production of Baku during the last four years, as given in the "Moniteur des Intérêts Matériels" (Brussels), is as follows: 1901, 671,200,000 pouds (1 poud=36 lbs.); 1902, 686,500,000 pouds; 1903, 595,800,000 pouds; 1904, 614,700,000 pouds. The output from springs showed a decrease during 1904, while the amount obtained by pumping reached the unprecedented figure of 593,200,000 pouds.

THE INSTITUTION AND GAS TESTING.

The Memorial to the Board of Trade.

IT may be in the recollection of readers that, at the special general meeting of the Institution of Gas Engineers held on Nov. 26, at the Earl's Court Exhibition, a memorial was adopted for presentation to the Board of Trade dealing with the subject of the recommendations made by the Departmental Committee on Gas Testing in the Metropolis. Mr. Charles Hunt, who introduced the subject, reminded those present that one of the recommendations of the Board of Trade Committee was that the 5-foot rate of consumption should be reverted to—a proposal strongly objected to when it became known at the annual meeting the previous June, when a resolution of protest was passed. The matter was referred to the Council of the Institution, who gave it careful consideration, and appointed a Sub-Committee to deal with it. The Sub-Committee, after holding several meetings, came to the conclusion that, in the interests of the gas industry generally, a memorial should be submitted to the Board of Trade embodying their opinion. The memorial was duly prepared; and on being read to the meeting, it was unanimously agreed to, and ordered to be forwarded to the President of the Board of Trade. It was not thought right, however, to give publicity to the terms of the memorial until it had been duly considered at Whitehall. It is available now for publication, we learn, and is given below, together with the letter of acknowledgment sent on behalf of the Board of Trade.

Institution of Gas Engineers, 39, Victoria Street, S.W.
Nov. 26, 1904.

To the Right Hon. GERALD BALFOUR, M.P.,
President of the Board of Trade.

Sir,—On behalf of the Council of the Institution of Gas Engineers (an Institution which comprises practically the whole of the gas engineers and managers within the United Kingdom, and is therefore representative of the entire gas industry) we, the undersigned, respectfully ask leave to memorialize your Honourable Board on the subject of one of the recommendations of the Committee recently appointed by you to consider and report as to gas testing in the Metropolis. We refer to the proposal that the gas under test shall, in all cases, be consumed at the rate of 5 cubic feet per hour. This is one that affects the entire gas industry, since the method of testing employed in the Metropolis is usually followed elsewhere; and in at least two of the Gas Acts passed last session relating to provincial gas undertakings, it is expressly provided that the method of testing for illuminating power shall be such as may be prescribed for the Metropolis.

Neither the quality nor the composition of the gas supply can possibly be uniform throughout the country. It is therefore desirable that a method of testing should be adopted which, within practical limits, will be equally fair for all kinds of gas of from 10 or 12 to 18 candle illuminating power, or what is usually known as common gas, and for such gas either made entirely from coal or being a mixture either of coal gas with carburetted water gas or of coal gas with oil gas. Such a method would, in the opinion of the gas industry, be effectively secured by due recognition of the following condition:

> "That in testing the illuminating power of the gas, the principle be observed of burning the gas at such height of flame as will best develop the maximum efficiency of the gas in the standard burner used for the time being."

An important step in this direction was taken by the South Metropolitan Company's Act of 1900, which provides that the gas under test shall be consumed at such a rate as shall give an illumination equal to 16 candles. This method gives comparable results for all qualities of gas made entirely from coal of 16 candles and under. It is not, however, equally applicable for gas of 16-candle quality or less, when such gas is a mixture of coal gas and carburetted water gas. But it was acceptable as a recognition of the injustice that is done to gas of lower quality than 16 candles by adherence to the 5 feet rate of consumption; and the proposal of the Committee to revert to such rate was received with great and general regret.

As to how the injustice referred to arises, evidence was given before the Committee; and therefore it may be sufficient to say that the standard test-burner was designed for 16-candle gas as formerly, made entirely from coal. It cannot give comparable results from any different quality of gas, if the 5 feet rate be adhered to, for the reason that the air supply to the burner does not admit of regulation according to the requirements of combustion, but remains practically constant whatever be the quality and composition of the gas under test. The result is that for gas of any lower quality than 16 candles, or for one which is a mixture of coal gas and carburetted water gas whether of 16-candle power or less—for this requires less air for combustion than does coal gas alone—the air supply is in excess and the illuminating power suffers depreciation. By the South Metropolitan method of testing, this depreciation is avoided, because a 16-candle illumination implies a uniform height of flame.

This, however, as already stated, applies only to gas made entirely from coal; and the question which we have carefully

considered is, What height of flame is best suited for all descriptions of gas? Experiments show that for all coal gas, such as is supplied by the South Metropolitan Gas Company, a flame 3½ inches high will give, for gas of 14-candle power or thereabouts, practically the same results as the 16-candle illumination, and a somewhat better result for gas which is a mixture either of coal gas and carburetted water gas or coal gas and oil gas. This is, in our opinion, only right, because, as was given in evidence before the Committee, this mixed gas is placed at a disadvantage by the present method of testing.

It seems to us that the adoption of a height of flame of 3½ inches would afford the means of comparing, on practically equal terms, gas of varying qualities made in any part of the kingdom; and it would consequently be a definite and satisfactory settlement of this much-vexed question. The recommendations, therefore, which we respectfully submit for your favourable consideration as applicable to all qualities of "common" gas (as hereinbefore defined) made within the United Kingdom, are as follows:—

1. That the No. 1 "London" argand, with 6 inch by 1⅞ inch chimney be the testing burner.
2. That the table photometer and 10-candle pentane lamp as prescribed by the Gas Referees—modified so as to suit the conditions herein submitted—be the prescribed apparatus with which all tests for illuminating power are to be taken.
3. That the gas under test be consumed at such a rate as to give a flame equal in height to 3½ inches—the result obtained to be corrected to a 5 feet rate of consumption by direct proportion as at present.

Should you so desire, a deputation of the Council will have pleasure in awaiting upon you, or upon anyone whom you may be pleased to appoint, with reference to this memorial.

We beg to remain, &c.,

(Signed) D. IRVING, President.
J. W. HELPS, Hon. Secretary.
WALTER T. DUNN, Secretary.

Board of Trade, 7, Whitehall Gardens, S.W.
Dec. 16, 1904.

Sir,—I am directed by the Board of Trade to refer to the memorial which was addressed to the President on the 26th ult., on behalf of the Council of the Institution of Gas Engineers, on the subject of the method of testing gas which was recommended by the Departmental Committee on Gas Testing in the Metropolis.

I am to state that the Board of Trade are aware of the importance of the question referred to in the memorial, and that they will not fail to bear in mind the views expressed by the Council when the Bills relating to the Metropolitan Gas Companies, which the Board understand are to be promoted in the next session of Parliament, are under consideration by them.

I am to add that, in present circumstances, the Board of Trade think it unnecessary to trouble a deputation from the Council to wait upon them.—I am, &c.,

(Signed) T. H. W. PELHAM.

The Secretary,
Institution of Gas Engineers,
39, Victoria Street, Westminster.

Another Large Gas-Engine.

In the "JOURNAL" for the 21st of February, we described and illustrated a 250-horse power gas-engine lately completed by Messrs. J. E. H. Andrew and Co., Limited, of Redditch, which embodied some interesting features. Another example of gas-engine development is afforded by the current number of the "Engineer," which contains drawings and a description of a 1200 effective horse power gas blowing-engine, which has just been made for the Société des Aciéries de Longwy by the Société Française de Constructions Mécaniques, at their Denain works. Three engines of this size are being constructed. Each has two gas cylinders placed side by side; the piston-rods in both cases being prolonged through the cylinder covers to work the blowing cylinders, placed tandem with the gas cylinders, which are water-jacketed, and each provided with a hole, through which the condition of the inside walls can be examined. The pistons are made of cast steel. Each cylinder is provided with two valve-boxes placed at the sides at each end. This arrangement was chosen to avoid massive castings, and to facilitate the inspection of the exhaust-valves. By its use all the levers for regulating and starting can be grouped together, so that the driver readily controls the charge, ignition, &c., while standing in one place. In addition to this, the various moving parts are easily seen and taken care of; while the regulating and starting of the engine can be done from the engine-house floor level.

The Leeds Water Committee on Tuesday last interviewed the nine candidates whose names were on the short list for the position of Water Engineer. As a result, the list was still further reduced to four; and before coming to a final determination, the Committee will send a deputation to visit the works where these gentlemen are now engaged.

THE GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 793.)

THE Stock Exchange was quiet last week so far as fresh business was concerned; the settlement of an unusually heavy fortnightly account pretty well engrossing attention. The tendency at first was rather irregular—oscillating not only from day to day, but within the compass of a day; and there were signs that, in the pursuit of profit, the scent was getting a little overrun. After the settlement, the movement was decidedly downwards; realizations to secure profits, however small, being the rule. But just before the close, the tone became a little firmer. In the Money Market, there was a good, strong demand, but not in excess of ready supply; and discount was mostly steady. Business in the Gas Market was not quite so active as the previous week; but the tendency was favourable—a large number of issues making more or less considerable advances in quotation. This was especially noticeable in the many issues quoted *ex div.*, all of which came out higher on adjustment. In Gaslight and Coke, the ordinary was fairly active, and maintained a steady attitude until just at the close, when 99¾, the lowest price of the week, was marked; the highest being 100¼. Of the secured issues, the debenture was unusually busy; and it advanced a point, with business done at from 90 to 91. The maximum was firm at from 93 to 93¾; and dealings in the preference ranged from 113 to 114½. South Metropolitan was more freely dealt in; and the range of prices was from 129¼ to 130¼. The debenture was done at 90½. Commercials continued very quiet. The 4 per cent. changed hands at from 116½ to 117¾, and the 3½ per cent. at 113 and 114½. The debenture was done at the low figure of 86½. Transactions in the Suburban and Provincial group were on about the usual scale; but a very large number of issues improved in price. Alliance old marked 21⅜, Brighton original 226½, and ditto "A" 166½. British changed hands at 41¾ and 42. South Suburban was done at 122 and 122½, Tottenham "A" at 125, and West Ham at 102½. Among those undertakings which had a rise without any transactions marked were Wandsworth, Southampton, Lea Bridge, Hastings, Bromley, and Bournemouth. On their local Exchanges, Liverpool "A" and Newcastle debenture advanced. Business in the Continentals continued in a quiet state. Imperial was strong, and improved a couple of points; transactions being marked at from 215½ to 218¾. European was not dealt in; sellers being conspicuous by their absence. Union had a fall, and was done at 117. Tuscan marked from 9⅝ to 9⅞. Among the undertakings in the remoter world, Bombay part-paid changed hands at 5, and Cape Town at 17. Primitivas were fairly active; and the ordinary was marked at from 6⅜ to 6 1/16, ditto preference from 4⅝ to 5⅛, and ditto debenture at 96¼ and 96¾. Buenos Ayres realized 12⅝, River Plate marked from 12 13/16 to 13, and San Paulo was done at 12¼ and 12½.

The closing prices are shown in our Stock and Share List on page 793.

ELECTRIC LIGHTING MEMORANDA.

London Electricity Bills — Corporation and Power Company Competition — Shorter Loan Periods for Perishable Plant — The Wiring Question — Risks of Supply in Residential Districts — Regulations and Fires.

WHEN the Earl of Camperdown and the other noble lords on whom has devolved the formidable duty of finding, in the chaos introduced into the question of electrical supply of London by their group of nine Electricity Bills, an open course through which they can escape with honour to themselves and justice (let us pray) to the numerous interests involved, took their seats for the first time on Thursday morning, they must have been struck with awe by the long portentous lines of wigged and gowned gentlemen who sat facing them, and the crowd of expectant witnesses and interested onlookers in the surrounding space. To give accommodation to all concerned, the Committee have had allocated to them the Grand Committee Hall—the portion of building which juts out and spoils the external symmetry of Westminster Hall just before reaching Cromwell's statue. Spacious though it is, and as convenient a place as is procurable, the unusual amount of opposition provoked, especially by the Power Bills, precludes all the provision that those professionally engaged could desire. There are the local authorities, electric lighting and power companies, gas companies, railway and tramway companies, and numerous others all finding their interests attacked by the measures in one or several ways. So complicated are the issues involved that the first sitting was consumed by the Committee taking counsel with the legal gentlemen present as to the course of procedure. The first Bill is to be the *corpus* of the Committee's deliberations; and, of course, the fate of that Bill will largely govern decisions on the other ones. As the result of the confabulation between Committee and Counsel, it was decided to consider first and alone the Administrative County of London Bill.

Mr. J. D. Fitzgerald, K.C., opened the case on Friday morning. The promoters of this the largest Bill are proposing to establish three extensive generating stations on the banks of the Thames in suitable positions for obtaining cheap supplies of coal as well

as a practically unlimited supply of water for condensing purposes; and from these stations the Company suggest distributing current to the whole of the existing electrical authorities in and about London, for lighting and other uses, and to supply electricity for power to all who may require it. This comprehensiveness will explain the huge opposition that the scheme has raised; but, on the surface, it does not show, though it envelops it, the main point on which the Gaslight and Coke and South Metropolitan Companies are in opposition. It will be found as the proceedings unfold themselves that the promoters of the Bill have scheduled (among the sites for their stations) land the rights over which Parliament has already bestowed upon the Gas Companies. But more on this head on a future occasion. The capital of the Company is proposed at a round £5,000,000; and the scheduled maximum charge for electricity is 1½d. per unit. For consumers taking only a moderate amount of electricity for power purposes, the scale will, it is stated, work out to 0·865d. per unit. The promoters—to show their graciousness to existing electricity suppliers in London—have inserted a provision limiting the amount of current to be used for lighting purposes to 20 per cent. of that taken. The examination of only one witness—Mr. C. H. Mertz—had commenced when the sitting ended on Friday.

The tables have been turned by the Accrington Corporation Bill this session. At one time, it was municipal objection to power company competition; in connection with this Bill, it is the Lancashire Electric Power Company who are objecting to the Accrington Corporation being granted powers of electricity supply outside their present area, and within the Power Company's statutory territory. The Corporation are proposing to supply electricity for tramway purposes both inside the borough and outside—in the districts of Clayton-le-Moors, Altham, Huncoats, Oswaldtwistle, and Haslingden; and as they are running their cables for this purpose, they also wish to supply current for lighting use. The upshot of the discussion was that the Police and Sanitary Committee refused to allow the supply in Haslingden for lighting purposes, but permitted it in the remaining districts, though they have attached a provision which relieves the Power Company from having to get the consent of the Corporation, as the distributing authority, in the event of the Company desiring in the future to supply in those districts. A further noteworthy point was evolved in these proceedings. So much has been said and written about the necessity of, and the neglect in, providing for the depreciation of electrical plant, the repayment of the loans for which is often not completed before the plant has to be relegated to the scrap-heap, that one can only applaud the decision of the Committee in this case not to allow a longer period than 20 years for the repayment of the loan for electrical equipment, even which period, the Chairman observed, anyone cognizant of electrical machinery knew was too long. The Corporation had asked for 25 years. A loan of £7000 for electrical fittings was ordered to be repaid in ten years.

The motion that it be an instruction to the Committee to whom the London County Council (General Powers) Bill is to be referred to omit the electric wiring clauses was defeated in the House on Thursday by the narrow majority of six on a fairly heavy vote. The discussion did not produce any new arguments *pro* or *con;* and for the moment there is nothing fresh to say on the subject. This discussion and division in the House (in the latter 380 members took part) shows how seriously, and very properly too, the matter is going to be contested. This is only the first step in the struggle; and the slender majority the promoters obtained in the first bout will be of assistance in the Committee stage to those who are hostile to this questionable speculation with the ratepayers' money. That the section was only saved by six votes on second reading will somewhat shake the confidence of the promoters in its eventual success in the struggle for life.

There are often good points to be gathered from the electrical notes in the "Municipal Journal." It is a paper that is extravagantly enthusiastic over municipalization; but, as we were able to point out a few weeks ago, the financial risks of electricity supply in residential districts are so great, and the results of so many undertakings so discouraging, that even our contemporary cannot withhold sounding a warning note now and again in dealing with the accounts of these undertakings. It is to say the least to the credit of the paper that its Editor does not refrain from publishing examples of bad as well as good accounts. Since previous reference to this subject of the greater risk involved by municipalities who undertake electricity supply in residential districts, the "Municipal Journal" has drawn attention to the last issued accounts of the Dartford Electricity Department. The undertaking, it is remarked, "is one of those mainly depending upon private supply of a lighting character; and consequently it would not be expected to show anything in the way of phenomenal results. To find, however, that its gross profit was *less than the working expenses* comes in the nature of a shock to those who are accustomed to the results of the early years of modern stations, of even small size." We can imagine the writer with his tongue in his cheek as he finely toned down what he had already stated with the concluding words. "Modern stations!" This one had only completed its first three months' working on March 31, 1902, so it is not old. But it had been running sufficiently long for a fair expectation of better results if they were possible. This is how things ended in the last completed financial year. The revenue amounted to £2389; the working expenditure exceeded this by £429. Adding to this the capital charges of £1887, we have a gross deficiency of £2316, which no doubt occasioned shock to many others besides the writer in our municipalistic contemporary. Purely residential districts outside London do not appear to afford very profitable investment for private electrical enterprise, let alone that of the more speculative municipal order. The South Metropolitan Electric Light and Power Company supply what is to a considerable extent a residential district; but although there was a good improvement in the net revenue last year, the Directors—doubtless much against their will—are compelled to keep the balance for the development of the business. When shareholders talk, as in this case, of being "sick with hope deferred," it gives an uncomfortable feeling to those who are managing the affairs of the concern.

The question of mysterious outbreaks of fires, in places where electric lighting is installed, has lately taken such a prominent position in the discussion of electrical affairs that one turns with interest to a paper lately read before a section of the Contractors' Association on the subject of "Corporation Regulations and the Powers of Enforcing them." In the Electric Lighting Act of 1882, electrical undertakers have imposed on them certain regulations for securing the safety of the public from personal injury or from fire or otherwise. Between 1897 and 1899, a few local authorities obtained powers in Special Acts to make bye-laws in this connection without provision being made for the approval of the Board of Trade. But in 1900 and subsequently, there has been an all but uniform practice for Parliament to require the approval of the Board of Trade. No bye-laws, however, under this class have been, we are told in this paper, submitted to, or approved of by, the Board of Trade up to the present time. But there are as models the Board of Trade regulations, what are known as the Institution rules, and the rules of the Phœnix Fire Office; and most Corporation regulations are based on the two latter, which are usually supplemented by the fads of the local electrical engineer. The whole point of the paper seems to be to show that this question of regulating the fitting up of premises is in a state of beautiful confusion, and that what one engineer requires to be done, another engineer will not allow at any price. Evidently there is laxity over this matter right away from Parliament down to the electrical contractor; and the sooner it is remedied the better, in view of certain recent happenings.

Since mention was last made by the "JOURNAL" of the controversy in the "Daily Telegraph" over the fire-raising propensity of electric lighting installations, the "parent of an Oxford undergraduate" has been relieving himself on the subject of the serious danger which overhangs most of the Oxford colleges. "Electric light has of late," he says, "been installed in many of the oldest colleges, where the buildings are largely composed of wood, centuries old, and, in many instances, the fittings are carried behind panelling so inflammable that a small spark would rapidly set the whole into an ungovernable blaze." It is not astonishing, after the stimulating controversy in the columns of our morning contemporary, that this parent should be somewhat alarmed. But even those of us who are not parents of undergraduates, but venerate the old colleges of Oxford, will hope that this particular parent is wrong in his surmise that little, if any, precaution against fire has been taken in installing in them the electric light.

Metropolitan Electric Lighting Finance.

In a return just issued by the London County Council, the results of the working of the electric light undertakings in the Metropolitan area in the year ending December 31, 1903, or March 31, 1904, are analyzed. A good deal of information is afforded in regard to the thirteen Companies and sixteen Local Authorities engaged in the supply of electricity; and one feature of the analyses was singled out for notice by the "Pall Mall Gazette" on Saturday. It is a matter to which we as well as they have frequently called attention, and it is one which, as they put it, "mainly concerns the investor who looks a little beyond his next dividend"—viz., the provision made for depreciation and reserves. Our contemporary says: The following table, which we have compiled from the return, is highly significant; and considering the number of years most of the Companies have been working, the amounts set aside for depreciation, &c., are obviously inadequate, having regard to the capital involved. It is pretty certain, at any rate, that there will be no more windfalls like that obtained by the Metropolitan Company from Marylebone.

	Total Capital.	Total Revenue.	Div.	Depreciation Fund.	Reserve Fund.	Years Working.
	£	£	P. Ct.	£	£	
Charing Cross and Strand	1,050,000	113,294	8	85,000	30,000	12
Charing Cross and City	1,106,400	57,719	Nil.	Nil.	Nil.	2
Chelsea	402,680	54,774	5½	37,060	Nil.	14
City of London	1,805,950	236,337	5	219,642	50,860*	12
County of London	1,350,000	108,886	4	33,044	5,000	7
London	954,095	76,976	Nil.	Nil.	6,572	18
Metropolitan	1,835,115	282,346	8¾	116,447	Nil.	14
St. James's and Pall Mall	450,000	117,107	14½	Nil.	62,029	14
Westminster	940,755	231,937	13½	137,312	11,253	13

* For premium on debenture redemption.

NOTES FROM WESTMINSTER.

[For Parliamentary Intelligence, see p. 778.]

The Pervicacity of the L.C.C.

With the utmost modesty, the contested proceedings on Private Bills were inaugurated by the sitting of two Committees of the Lower House on Tuesday—the Sunderland and South Shields Water Bill being one of the measures that came immediately under the consideration of a Committee who had Captain Jessel for their Chairman. Another Committee were simultaneously being entertained by the learned rhetoric of King's Counsel and witnesses on the momentous question of the sale of bread by weight in London; the matter having been raised by a Bill, promoted by the London County Council, which left no loophole for the purchase and sale of bread—other than rolls or twists—except by weight. This is mentioned because the measure had raised a host of opponents from the trade, who alleged to a man that the conditions the Council were seeking to impose on them were unworkable, and would involve inconveniences in the business relations between themselves and their customers. But this is a characteristic of the policy of the peculiar people of Spring Gardens; and successive sessions find their parliamentary exploits more and more unpopular. Even if cause for parliamentary warfare is fairly excusable, some pretext is found for making the County Council action as impracticable as possible. Opposition, however, only stiffens their obstinacy; and already events in the present session evince the unbendable will even when threatened by Parliament. Quite a *furore* has been raised over the Council's Port of London Bill and the Building Acts (Amendment) Bill, both of which have among their opponents the London Gas Companies. True, in the case of the latter measure, the Council have decided to drop all save the fire clauses; but as to the Port of London Bill, not even the announcement that the Government intend to oppose it has had the slightest effect upon them. They are going to continue it, albeit they are warned that there are inherent difficulties in the Bill which justify the Government in their opposition, and that to proceed is rushing blindly into disaster. With the Government in opposition, the fate of the Bill is sealed. There may be readers who have been inclined to think we have looked with prejudiced eye upon the obstructive policy of the County Council in their dealings with the London Gas Companies; but these facts will assist them to the view that the parliamentary procedure of the Council in all directions is distinguished by much that is of the same questionable kind.

The London Gas Bills.

It was on Thursday morning that the gas work of the session was introduced; and the Bills that led the way are those which transcend all others in this line in point of both importance and interest. They are the Bills referring to the London Gas Supply; and it may be confidently said that their fate is being watched for with the greatest avidity throughout the gas industry. Upon the issue of the struggle between municipal misconception and practical experience and knowledge of public requirements, much depends in respect of the influence it will have upon future legislation. Mr. F. Cawley is the Chairman of the Commons Committee to whom this group of Bills has been referred; and it will not occasion surprise to learn that the members early confessed that they could not grasp the scientific principles in which the questions submitted to their judgment are embedded. This it cannot be alleged is due to any want of active assistance from the promoters or opponents; it may conversely be alleged that it is due to too much provision by the contending parties. For, on these Bills, we have opposed to the Companies Sir Ralph Littler, K.C., Mr. Freeman, K.C., and Mr. Talbot; and opposed to the County Council and other authorities are Mr. Balfour Browne, K.C., Lord Robert Cecil, K.C., Mr. L. Rostron, and Mr. Bernard Wilkinson. Professor Frank Clowes, Professor Percy Frankland, Mr. W. A. Valon, Mr. W. J. A. Butterfield (on the South Suburban Bill only), and Mr. J. Wilkinson, of Halifax (on the question only of the efficiency of ammonia purification), are giving evidence for the County Council or other Authorities, or are retained for that purpose, if required. Present for the Companies or as interested spectators were Col. Sir William Makins, Bart., Sir George Livesey, Mr. W. G. Bradshaw, Mr. Corbet Woodall, Mr. H. E. Jones, Sir William Ramsay, Sir James Dewar, Mr. T. Goulden, Mr. Charles Carpenter, Mr. S. Y. Shoubridge, Mr. S. H. Jones, Professor Vivian B. Lewes (attending on a Speaker's order), Mr. W. J. Dibdin, Mr. Otto Hehner, Dr. Samuel Rideal, Mr. Robert Morton, Mr. Walter Hunter, Mr. Frank Bush, Mr. D. Milne Watson, and Mr. Chas. M. Ohren—not all prepared to give evidence, but the names indicate the mass of specialized ability in gas administration, engineering, and chemistry that the opening of the fight saw assembled in room No. 6.

Testing and Confusion.

The proceedings on the first day had as their background extreme dulness, across which flashed occasional interesting incidents. The day was devoted exclusively to the question of the testing-burner. Sir Ralph Littler, in his opening for the County Council London Gas Bill, droned through the ancient and modern history of the testing of gas in the Metropolis; and by the time he had finished (after occupying rather more than an hour), the Committee were completely mystified. In the course of his address, the Committee elicited from Sir Ralph that, though the County Council were not proposing it, they would like to see uniformity in the gas supply of London, even to the reduction of the Gaslight and Coke Company's gas from 16 to 14 candles, in view of the fact that Parliament had permitted both the South Metropolitan and Commercial Gas Companies to reduce their power. True to his perverted notions—assumed, some people are unkind enough to think and say, to fit his *rôle*—Professor Clowes (who was the first and only witness for the Council on the question of gas testing) would persist in saying that there were two grades of gas supplied in London—16-candle and 13-candle gas. "Thirteen-candle gas?" ejaculated the surprised Mr. Freeman. "Yes," answered the unperturbed witness, "the South Metropolitan Gas Company call their gas 14 candles, but it is only 13 candles." What he wanted in respect of testing was the 5 feet rate of consumption for all qualities of gas; in other words, "a uniform method by which could be defined the relative quality of the gas." But under the skilful and persevering cross-examination of Mr. Balfour Browne, the Committee were led to appreciate that, adopting Professor Clowes's or the Board of Trade Committee's uniform method of testing for gases that were not uniform in quality, would not accord to the lower quality gas its true value to the consumer, who, if he be a wise consumer, raises and lowers his gas until he gets the best light possible from it. The Committee also saw that any slight discrepancy from the standard of 14 candles would be exaggerated by the uniform rate of consumption. There was no doubt that at this point the Committee had grasped the absurdity of applying the same test to two articles differing in character, to ascertain their real value. The really ridiculous contentions of the County Council and their adviser were further mauled by Sir George Livesey, and later on by Mr. H. E. Jones. But the Committee announced their dilemma. Parliament had before considered this highly technical matter, and had failed—not being experts—to make anything of it. They referred it to a Committee qualified to deal with the subject; and now they (the present Committee), unqualified as their predecessors had been to decide upon such matters, were asked to go behind the Departmental Committee's report. Counsel for the County Council made the most of this; while Lord Robert Cecil urged upon the Committee that, if the Companies could show that the Departmental Committee's proposal would act unjustly upon the Companies, Parliament ought not to be tied to that Committee's recommendation. Truly the Companies, on this point, had a difficult task before them. However, that they apparently had a grievance, the Committee admitted; and they thought the parties might agree on a system of testing, and settle the question once and for all. Here Sir George interposed one of those notable epigrams of his: "Competition, not this stupid testing, is the great safeguard of the public." The truth of this was recognized by all but the County Council representatives; the adjective applied to the testing tickled all who heard it. Shortly afterwards the Committee somewhat cleared the road by definitely informing the Companies that they could not, under the circumstances in which they were placed, accept clause 6 of the Companies' Bill—the one specifying the $3\frac{1}{2}$-inch flame. It is a big order, said the Chairman, to ask a Committee of the House of Commons to substitute the recommendation of a scientific Committee by another clause of a highly scientific kind. This introduced a totally new aspect of the question; and Mr. Balfour Browne urged upon the Committee that both the South Metropolitan Company and the Commercial Company would be quite happy in being left with their present test, which permits the gas to be consumed at such a rate as will produce a 16-candle flame. Upon this, at the then stage of the discussion, the Committee could not well express an opinion; but they closed the day's sitting by intimating their view that, if the parties could agree upon some slight modification of the Departmental Committee's recommendation, the whole dispute might be ended. The Companies were willing to see what could be done; but the County Council representatives quickly and quietly vanished.

The Support of Science.

The night's absence from the Committee rooms did not compose the differences of the parties; it being the duty of Lord Robert Cecil to inform the Committee that a letter had been forwarded by the Companies to the County Council, but they declined to discuss the question. That is the Council all over—negligent of everything in such matters as these but their own policy. The morning was spent by the Companies' representatives in dealing crushing blows to the County Council's proposal and the Departmental Committee's recommendation of a fixed rate of consumption in testing for low illuminating power gas. In the first place, Mr. W. J. Dibdin put in figures and a most instructive diagram. By way of illustration, attention was directed by him to three out of numbers of cases where identical results were obtained by testing the gases under the present legal method—that is to say, by burning the gas at a rate to produce a 16-candle flame; but when burned at the fixed 5 cubic feet rate, variations between 12·1 and 13·2 were obtained. A 14·4-candle gas, tested by the present legal method, also gave uniform results; but when tested by the 5 cubic feet rate, there were variations between 11·9 to 13·6. Under such circumstances—the results having been found by close and special investigation into the question—what other conclusions could Mr. Dibdin find than that the 5 cubic feet rate is unfavourable to a low quality of gas, and is very uncertain? Besides this, not only is an increased difference obtained between two sets of tests, but there is a variation shown due to the varying composition of the gas. Sir R. Littler

applied himself to trying to strengthen the weakness of his position by prejudicing witness's work by calling attention to the high qualifications of certain members of the Departmental Committee who had recommended the fixed rate of consumption. What Mr. Balfour Browne thought of this performance is shown by his satirical comment, "I don't call that cross-examination." Whatever satisfaction Sir Ralph may have felt, however, was short-lived; for if eminence was what he wanted, he had it when the Companies produced, in support of their case, Sir William Ramsay and Sir James Dewar. In succession, they proved the unfairness of the Departmental Committee's proposals. At the outset, Sir William gave it as his opinion that it is impossible to have different testing-burners for all different qualities of gas; and that, unless more of a low quality gas than 5 cubic feet is passed through the present prescribed burner, there could not possibly be proper combustion. With a fixed rate of consumption, it is out of the question to get any uniformity in result from day to day. During his cross-examination, Sir William suggested—and the suggestion appeared to rather commend itself to the Committee—that the County Council clause should be altered to a rate of consumption of 5·7 cubic feet for 14-candle gas. This was hardly a "compromise" as he called it; it being practically the Companies' present method defined. Sir William was also able to confirm Mr. Dibdin's tests; and so was Sir James Dewar. The latter gentleman regarded Sir William Ramsay's suggestion as reasonable; and he explained to the Committee how, in consuming gases, if there is not a proper degree of oxidation, an inefficient result is obtained. Mr. Otto Hehner and Dr. Samuel Rideal did their part in weakening the foundation of the 5 cubic feet rate. It was a bit of a shock for the County Council when Mr. T. Goulden, the Chief Engineer of the Gaslight and Coke Company and a 16-candle gas man, also testified that for gas of anything below 16 candles a fixed 5 cubic feet rate of consumption in the 16-candle argand burner is not a fair test. This brought to an end the evidence on this point for the Companies; and the Chairman called for Professor Lewes, but there was no Professor Lewes present. He had been ordered by the House to be in attendance at 11 o'clock; but, it was thought, he had taken advantage of a generous estimate that the evidence would carry out to two o'clock to fulfil his morning's duty at Greenwich. The Chairman would not admit any excuse for non-compliance with such an order; and requested that Professor Lewes should be communicated with, in order to get his attendance as rapidly as possible. Mr. Balfour Browne appeased the Committee by his explanation, and assurance that the Professor intended no discourtesy to the House. In addressing the Committee for the Companies, Mr. Balfour Browne made an effective speech; but there were few present who could hardly believe their ears when he expressed the opinion that the Departmental Committee's proposal was "a slip," but many were able to agree with him that the Council by their Bill were trying to get something out of the Companies to which the Council are not entitled. Professor Clowes (who was recalled by the Committee) practically admitted as much when he said that a fixed rate of consumption would not give the "best value" to the gas. Another statement of his was that Sir William Ramsay's proposed 5·7 cubic feet would be introducing a further complication. Setting the consumption, too, to a 5·7 cubic feet rate, he asserted, would involve extra trouble. There was a charitably good-humoured laugh went round the room. If that is the kind of thing a scientific man has to descend to when in the service of the London County Council, then there cannot be many who envy him his position. Sir Ralph Littler's reply was well stuffed with copious extracts from the evidence before the Board of Trade Committee. The short afternoon sitting was not productive of more than an explanation to the Committee of the points in other parts of the County Council Bill on which the Companies are at variance with the promoters, and reference to clauses on which they are agreed. The sulphur and standard price clauses are the ones over which there will be the greatest discussion. But no start was made with them on Friday afternoon; it being thought that, with respect to certain matters, the parties might assist in relieving the Committee by an adjournment. The question of the testing-burner stands over for decision. Professor Lewes was in attendance after lunch; his explanation being that the order had not reached him. It is understood that the Committee were later instructed in the art of photometry, by means of apparatus temporarily installed in one of the lower rooms of the House.

Interesting Decisions. It was two o'clock yesterday before the Committee commenced work; but it was found that, with, no doubt (if we may believe Sir R. Littler's bland announcement), the best desire on the part of both the County Council and the Companies to arrange their differences on the minor points, they had been unable to agree. But the afternoon's work practically disposed of both the County Council Bill and that promoted by the three London Gas Companies. Excepting that the promoters of each proposed and wanted things that the other did not, there was a similitude between the two measures; and what was requisite was a little careful pruning and adjustment to make the one Bill—the County Council clauses were the ones discussed—do for the two. The gas-testing question is still in abeyance, it will be understood; and the result of yesterday's work, briefly told, will put readers in possession of the present position. In the first place, clause 8 of the County Council Bill was withdrawn. This refers to the question of the alteration of the standard price; but, in withdrawing it, the County Council wish it to be understood that their action on this occasion is not to be used to their prejudice at any future time. Then there was a long discussion between Lord Robert Cecil and Sir R. Littler on the clause providing for the testing for calorific power, sulphur impurities, and illuminating power with flat-flame burners. There is no forfeiture attached to these tests; and the Companies raised the objection to them that it was a little hard that the tests should be put upon them, and at their expense and trouble, when they were for no other purpose than to advance scientific information. At the same time, they made it clear that they did not wish to take up any preposterous attitude with regard to the clause. The Companies asked for the removal of the references in the clause to the Gas Referees, and the substitution of the London County Council, and for the "best available burner" being used for the flat-flame tests; and there did not appear to be any objection to their proposal. As these tests were merely for the gaining of information, it was asked that Sunday testing should be specifically excluded; and later on the Committee agreed to this. As to tests for sulphuretted hydrogen, the Companies desired a quantitative test, as favoured by Mr. Vernon Harcourt when before the Departmental Committee; but the Chairman announced that the clause in the Bill would be kept as it stands. It leaves to the Gas Referees the prescription of the test; but it is not to be more stringent than the mode specified in Schedule A of the Gas-Works Clauses Act, 1871. The Companies were successful in their opposition to the clause which merely suspended their liability to forfeiture for sulphur impurities other than sulphuretted hydrogen, until such time as the Board of Trade might make an order applying again the provisions of any Act relating to a Company with reference to sulphur impurities, &c., under circumstances described in the clause, which was quoted in full on p. 986 of the "JOURNAL" for Dec. 27 last. In respect to it, the Committee preferred to abide by the report of the Departmental Committee. As to the supply to the testing-places, one service-pipe and a tap has been provided for, but the tap will be sealed in some way so that it cannot be used without the knowledge of the parties. The Companies are to have access to the taps. Sunday testing is not to be obligatory, but optional on the part of the Council, though the Companies could not see any good in its being even optional, and objected. On the clause giving the Chief Gas Examiner further powers as to forfeitures, the Companies wanted to have the privilege of always paying the maximum penalty when found guilty of "substantial" default by the Chief Gas Examiner, rather than being compelled to go to the Police Court. But publicity was what the County Council wanted—their full pound of flesh, as it were; and the Committee allowed their clause to stand. The clause inflicting a penalty not exceeding £50 for each day during which a Company neglect to comply with the prescriptions of the Referees was discussed. The Companies preferred that things should remain as at present. The Chairman thought the clause ought to be read subject to clause 10, which provides for an appeal to the Chief Gas Examiner against prescription or certification of the Gas Referees; but he left the clause over for decision with the testing-clause. The Companies wanted the day defined for the purposes of testing from midnight to midnight; but the present day, from 9 a.m. to 9 a.m., is reserved by the Committee.

Points before the Unopposed Committee. Among the Bills before the Unopposed Committee of the Commons was that of the Walker and Wallsend Union Gas Company, in which they are seeking powers in respect of a site for new works. From the Company's last Act, the Lords expunged the land clauses after the Commons had passed them. The present Bill is to put the Company in possession of another site, against which there was not the same local objection. On the Accrington Gas and Water Board's Bill, it was understood from remarks by Sir Chandos Leigh that liberty in the matter of discounts had been defined at 10 and 15 per cent. "We do not want to fight this matter all over again," added Sir Chandos. In connection with the Bill of the Brompton, Chatham, Gillingham, and Rochester Water Company, the Local Government Board in their report had drawn attention to the hardness of the water. The Consulting Engineer (Mr. Taylor) gave the Committee information that the cost of plant to soften the water (the hardness of the mixed waters is only 18°) would be £53,000; and the additional cost of working about £800 a year. As no consumer had asked for the water to be softened, and in Mr. Taylor's opinion it was utterly unnecessary, the Committee set aside the impeachment of the supply made by the Local Government Board.

The question of the ownership of drawings and other data made by a city engineer while acting in a private capacity has been settled by the Colorado Court of Appeals. The following is a summary of the decision. An ordinance requiring the city engineer to inspect and pass the construction of all public works and to do the surveying and engineering ordered by the city, and requiring him to preserve all plans and documents pertaining to his office, and to deliver them to his successor, does not require him to turn over to his successor books containing field notes made by him in surveying lots of individual owners upon their application, under their employment, and at their expense, but such books are his private property.

AT THE NATIONAL PHYSICAL LABORATORY.

THREE years have passed since the Prince of Wales opened the National Physical Laboratory which had found its home in one of England's stately mansions. At Bushey House, Teddington, the halls and rooms of which were one-time habited by the best of life's luxury, have during the three years been devoted to a wealth of research and investigation of the highest importance to commerce and industry, and to the standardization and testing of instruments and materials of various kinds. But this research and investigation has not until recently included special work for the gas industry, though provision is made for it, and the Committee and General Board are willing and anxious to undertake it. Work, of course, suggests support; and this the gas industry has not accorded the laboratory. Investigation associated with the electrical industry is clearly well-established at Bushey House; and the gas industry should also, in their own interests, supply the work and means for being identified with a centre of scientific operation that is of such great national importance. A start, however, has been made. At the request of the Institution of Gas Engineers, a comparison of the secondary standards used in various countries—viz., the 10-candle pentane lamp, the Hefner-Alteneck amyl-acetate lamp, and the carcel lamp is being undertaken. The Institution have provided the Hefner and Carcel lamps, with various accessories; and, as similar researches are in progress in France and Germany, the work promises to be of considerable importance. This leads us to mention that the Committee of the Laboratory also feel that it is highly desirable to establish if possible some primary standard of light—for example, the radiation from some definite surface at a definite temperature. The hope is entertained that the high temperature work that is now in progress in the thermometric department may allow of this being done.

The General Board of the Laboratory meet annually to receive and consider the report of the Committee, and to settle on the scheme of work for the year. This meeting took place last Friday; and on the occasion there were present a considerable number of visitors who had been specially invited to inspect the equipment of the Laboratory, and to learn of the diverse and important character of the work that is proceeding there. Science and the numerous industries were represented by men bearing names of world-wide distinction and influence; and they were received by the Chairman of the Executive (Lord Rayleigh), Lord Kelvin, and the courteous Director of the Laboratory (Dr. R. T. Glazebrook, F.R.S.). The inspection of the departments and the apparatus commenced immediately on the arrival of the visitors, who made an interested examination of the wonderful collection of apparatus and appliances employed in the testing of thermometers, for electrical investigation, photometrical research, in metallography, metrology, optics, chemistry, engineering, tidal prediction, and so forth. Of course, a visitor identified with gas supply would, on finding himself in such a place, turn his attention more minutely to the photometrical department, which has at its active head Mr. Clifford C. Paterson, and much of whose appliance-improving and standardizing work in connection with photometrical equipment is found in existence there. It may, we think, be asserted that, for a great range of ordinary work, there is not a better equipped photometrical department in the country; and very soon there will be the means there for carrying out tests on electric arc and gas lamps of considerable power. To that extent, for a brief space of time, the capacity in this department is limited.

The first thing that one's attention is drawn to on entering the photometrical rooms, is a fine photometer bench of the Reichsanstalt pattern (made by Franz Schmidt and Haensch.) It is fitted with a Lummer-Brodhun photometer, and has much additional apparatus ingeniously fitted to it by Mr. Paterson, which gives him not only a large field of work, but means of verifying detail and ensuring certainty in repetition work. Most of the lights are compared through the medium of the electric incandescent lamps. But these are only used as secondary standards —the primary one being the Harcourt 10-candle pentane lamp, and with this the secondary standards are constantly verified. Among the fittings is observed an electric lamp rotating appliance with mercury contacts; so that the average of the illuminating power on the horizontal plane of the electric incandescent lamp under test can be obtained by a single observation. This, of course, greatly facilitates work. The regulation of the voltage of the electrical current to the photometer is also provided for by the use of a Kelvin voltmeter with a three-metre scale. This is very necessary, as it is found that a 1 per cent. variation in the voltage will occasion a 7 per cent. variation in candle power. Mr. Paterson is confident that there can be no variation here through any change in the amount of the voltage. There is also an attachment to the photometer bench for measuring candle power distribution round glow lamps. Among other instruments were observed, in addition to the Harcourt pentane lamps, the hefner and carcel lamps, a Simmance-Abady "Flicker" photometer (which plays a prominent part in the work here), and several forms of gas-measuring apparatus used in conjunction with the work of testing. Having examined the rooms and the instruments, one leaves with the feeling that everything that is possible has been done here to evade error. A portable photometer was also on view; and this was being utilized, with a tramcar reflector and an electric lamp in the distance, and a pentane lamp as the standard, for demonstrating to the visitors the action and purpose of the "Flicker" photometer, which by the way was presented to the Laboratory by Messrs. Alex. Wright and Co. Diagrams and other exhibits of interest were also inspected. In a room near the chemical laboratory was found one in which life-tests of incandescent electric lamps and gas-mantles are proceeding. There were 21 mantles in use—some Welsbach, others Zeimar. Some of them were in sorry condition; and the impression obtained from an inspection was that they would be giving a better account of themselves if the burners received a little cleaning, and would then be undergoing their life-test under somewhat more normal conditions than they are apparently at present.

We have referred in the foregoing to what was seen in the photometrical department; and some additional information is gathered from the report of the Committee as to the test work that proceeded therein during the past year, under the direction of Mr. Paterson. Investigations on the 10 candle-power Harcourt pentane lamp, which were begun in the later part of 1903, were completed. The following formula—showing the variation in candle power with humidity and barometric pressure—has been found experimentally, and enables the standard to be used in photometric comparisons in which the test-lamp is unaffected by atmospheric conditions:—

$$\text{Candle-power} = 10 + 0{\cdot}066\,(10 - \epsilon) - 0{\cdot}008\,(760 - b)$$

where ϵ = litres of moisture per cubic metre of pure air;
b = barometric pressure in mm.

Care has to be taken in the setting up and regulation of the lamp, as well as in a thorough ventilation of the photometer-room; but, it is stated, a standard has yet to be found which combines exact reproducibility with simplicity and ease of manipulation. Special attention has been paid to the comparison of seven pentane lamps by different makers against the National Physical Laboratory's standard, in order to determine the extent of possible variations in the candle power of lamps made to the specification of the Metropolitan Gas Referees. The variation in any two lamps has been under 1 per cent.; and in most cases the difference is less than ½ per cent.—a result which justifies the adoption of this lamp as a standard of illumination. Some standard electric glow lamps—presented to the Laboratory by the Ediswan Company—have been carefully compared against the pentane lamp, and now, as mentioned previously, form the working standards of candle power. They have been re-compared from time to time, in order to see that no variation has occurred in their illuminating power. Inter-comparisons, the report also states, have been made by means of glow-lamps with the National Standards Bureau of Washington, and the Electrical Testing Laboratories of New York, as well as with the Reichsanstalt. Further investigations to determine the ratios between the standards of candle-power accepted in America, Germany, France, and Great Britain are now being undertaken. In addition to the ordinary photometric tests, comparative tests have during the year been made on two systems of street lighting to determine the illumination in the street given by gas and electric lamps respectively. For this purpose, a portable photometer was constructed; the standard being a previously calibrated electric glow lamp, run off a portable battery of accumulators—the voltage on the lamp being varied and the photometer head remaining fixed. Measurements were made at night on four separate occasions in streets lighted by the two systems. Other special electricity tests have constituted a prominent part in the work of the Laboratory during the year.

What is wanted now is to extend the usefulness of the Laboratory; and to do this further financial support is required. It was one of the objects of last Friday's inspection to stir up a greater interest in the work, so as to secure what is necessary. It may be of interest to point out the position in this respect. In addition to the grant of the site and buildings at Bushey House, the Committee have received £19,000 for building and equipment, and an annual Treasury grant of £4000. This is to be increased to £5500 this year, and to £6000 next; and, in addition, a grant of £5000 is to be made for further equipment. But it must be emphasized that these grants do not nearly reach those made in other countries for similar purposes, although they will enable the valuable work that is being done to be greatly extended. Besides the £4000 received from the Treasury, the income of the Laboratory for 1904 was supplemented by donations and subscriptions amounting to £2300; the Gassiot fund (for magnetic work), £450; and fees for work done £6000—making in the whole an income of £12,750. This is too little for the expenses and maintenance of the work and skilled staff, and for the equipment on an extended scale to expand the usefulness of the Laboratory. It has been a complaint of long standing that this country does not possess the institutions through which the aid and authority of Science can be brought to bear on industry and commerce. Here is what is required—the place, the right men, and most of the necessary appliances. In many ways, the manufacturers of the gas industry could avail themselves of the services of the Laboratory at moderate fees—in the testing of materials and appliances, in the standardization of weights and measures, in chemical tests, in photometrical work of all kinds, and in fact, in several other directions that inquiry on their own part will reveal to them. Arrangements can also be made for tests by the staff outside the Laboratory. We frequently have our attention drawn to the results of tests of burners, mantles, and lamps which have been obtained from the great laboratories of Germany. We shall, now

that a more intimate acquaintance has been made with the work proceeding at Bushey House, Teddington, under the direction of Dr. Glazebrook, be far better pleased to see results of tests certified by the National Physical Laboratory, and instruments that are better for being standardized and certified, but for which official attestation of accuracy is not already provided, bearing the distinguishing mark or laboratory monogram of the N.P.L. The gas industry is not at the moment directly represented on the Committee; but the time may come if sufficient support is rendered when it will be. But as has been seen, the work is supported by the Treasury; and further confidence will be given in it by stating that the Laboratory is under the control of an Executive Committee of which Lord Rayleigh is Chairman, and which consists of representatives of the Royal Society, the Institutions of Civil and Mechanical Engineers, the Iron and Steel Institute, the Institution of Electrical Engineers, and the Society of Chemical Industry.

The researches concluded during the past year will give an indication of the wide character of work which the Laboratory is capable of undertaking. These were: An investigation for the Engineering Standards Committee into the properties of insulating materials at the temperatures ordinarily reached in generators and motors, and a study of the distribution of temperature in the coils of such machines; an examination of the allowances necessary to secure proper working between the running parts of machinery; an investigation into the properties of different qualities of gutta percha; photometric and life tests of incandescence lamps under various conditions; an investigation into the methods of obtaining and measuring high temperatures of 1800° C. to 2000° C.; the erection and testing of a standard lathe for cutting leading screws for large lathes to a very high order of accuracy; an examination of the properties of nickel steels; the construction of the electrical parts of a standard balance for the measurement of an electric current; and the construction of a machine for examining the effect of rapid alternations of stress on materials used in engineering practice. In addition to these and other researches which have been successfully carried through, a number of inquiries have been declined for want of sufficient equipment. The Committee hope that this may, however, be shortly remedied; and we sincerely hope so too.

British Weights and Measures.

The British Weights and Measures Association have issued a leaflet which shows graphically that taking the whole world, and viewing the question from the point of view of population, area, or trade, the use of the metric system is still far in arrear of the measure employed in this country. If one looks at a map of the world, and puts to the credit of the inch the whole of the British Empire, the United States, Russia, and large tracts in Africa, as well as an equality with the metre in South America, light is thrown on the reasons for the existence of the Association. They see no occasion for the greater part of the world bending the knee to the metre because a comparatively small part has done so; and they believe that the universal adoption of the metre would be more beneficial to the trade of existing metre-using countries than to that of the British Empire.

The Training of the Gas Engineer.

The "County and Municipal Record" is publishing a series of articles on the essential qualifications of the chief officers of public services. The article this month is on "The Qualifications of a Gas-Works Manager," and whoever is the author it is certain that he has been "through the mill" himself. The article shows the multifarious nature of a gas manager's duties; but the author hopes that their statement will not frighten young men thinking of entering the profession, "for, after all, the busiest man is the happiest man." Here is an extract from the article: "Perhaps the simplest way to determine the qualifications necessary for a gas-works manager is to trace the career of one who has chosen this as his profession. At the outset, let us hope he is a lad of nerve, confidence, and resource; softer stuff will not stand the tear and wear of the constant demand made on the supplier of light, heat, and power to a community. Day and night, year in year out, a gas-works is a 'going concern' in the most literal sense of the words. Even Day of Rest there is none. Consequently, only those whose heart and soul are in their work, and who deny themselves constantly, can hope to make their mark in so exacting a profession. Taking it for granted that he has had a good Board School education, the first work a prospective gas manager should enter upon is that of a mechanical engineer, or, better still, let him apprentice himself to a firm of gas-plant makers. In after-years, he will be expected to design and erect retort-benches, condensing and scrubbing apparatus, exhausters, purifiers, station meters, gasholders, governors, pumps, conveying machinery, water-gas plant, &c. Then his mechanical training will stand him in good stead. He must train himself to be a neat and accurate draughtsman, and a knowledge of the principles of building construction must be acquired, so that the kind of building best adapted for holding gas appliances may be put up in the works. All this is necessary, as every year some part of the buildings or plant in a gas-works has to be renewed or enlarged, owing to increasing demand for gas or to the wearing out through constant usage."

GERMAN CONTINENTAL GAS COMPANY.

Jubilee Celebration.

Last week, reference was made in the "Journal" to the fact that this important Continental gas undertaking would, by the time the announcement was in the hands of our readers, have celebrated the fiftieth anniversary of its formation; and a short account of the manifold activities of the Company was given. The "Anhaltischer Staats-Anzeiger" of Tuesday last furnishes an interesting report of the manner in which the jubilee was celebrated in Dessau, where the headquarters of the Company are located; and we have taken from it some particulars of the proceedings on so historic an occasion.

The fiftieth anniversary of the formation of the Company fell on Sunday, the 12th inst., and early in the morning of that day a ceremonial visit was paid to the graves of the founder, Herr von Unruh, the first General Manager, Herr Wilhelm Oechelhaeuser, and other deceased officers of the Company. At ten o'clock, Herr W. von Oechelhaeuser, the present General Manager of the Company, with the staff in attendance, formally received official congratulations from the representatives of the Corporation of Dessau, and of various industrial bodies, as well as from the Managers of its different works, with the exception of Warsaw. It was considered inexpedient, in the unsettled condition of the latter city, that the Company's representatives there should leave their posts to take part in the celebrations at Dessau. Many presentations were made, and congratulatory addresses offered, for which Herr von Oechelhaeuser expressed sincere thanks.

A banquet—to which the Company had issued some eighty invitations—was given in the afternoon in the large hall of the "Goldenen Beutel." A distinguished company was present. The toast of the German Continental Gas Company was proposed in an eloquent speech by His Excellency the Cabinet Minister von Dallwitz. He referred to the national, as well as local, importance of the Company, and to the debt which Germany owed to its founder and to its former and present General Managers for their services in establishing and extending such a home industry. In particular, he alluded to the benefit accruing to workmen from the social provisions of the Company for the employees. He coupled the name of the General Manager, Herr von Oechelhaeuser, with the toast, which was drunk with honours. Later Herr von Oechelhaeuser replied; and, at his instance, the assembled company drank prosperity to the forty-four towns and communities with which the Company had business relations. Speeches were also made by Herr D. U. Bethe, the Chairman of the Control Committee of the Company, Privy Councillor Winterseldt, Herr Krause, of Berlin, the Burgomaster of Dessau, Dr. Ebeling, Dr. Bueb, the Chief Chemist of the Company, and Professor Dr. Adolf von Oechelhaeuser. The last-named made a humorous speech, in which he appealed to shareholders to further the lofty aims of the Company. In the course of the evening congratulatory telegrams were read from, among others, Professors Bunte and Slaby, Privy Councillor von Brumme, and others.

Civic honours had been conferred by the Corporation of Dessau, in connection with the celebration, on Herr von Oechelhaeuser; and a civic address to him was presented through the Burgomaster Dr. Ebeling. It set forth the manifold benefits which his business instinct and ability had conferred on the town. The address was illuminated by the artistic work of Herr Max Korn. At the top were depicted the chief offices of the Company, and to the left was a symbolic figure holding out a lighted torch. In the background were shown the tower of the gas-works and a gasholder. The remainder of the decorative work referred to other spheres of activity of Herr von Oechelhaeuser.

INTERESTING FEATURES AT ROTHERHITHE.

The New Retort-Discharging Ram.

The "Co-Partner" retort-discharging ram has invested the Rotherhithe station of the South Metropolitan Company with fresh interest; and it may be said that the construction and operation of the new co-operator in retort-house work were the central features for the members of the London and Southern District Junior Association on a visit which they paid to the works on Saturday afternoon, accompanied by their President (Mr. Walter Grafton) and Secretary (Mr. P. F. Scarth). The Rotherhithe station is, for the time being, not only a gas-making establishment, but it is a "Co-Partner" ram manufactory of a no mean order, as the visitors saw as they were shown the work in progress by the Station Engineer and Manager (Mr. W. D. Hunter) and the Mechanical Engineer (Mr. W. A. Barnett), who were assisted in escorting the members by the General Foreman (Mr. Dicks).

The two first-named gentlemen, it will be remembered, were jointly concerned in the invention of the original machine; and they have worked together in its improvement, aided by the experience in working since last summer. There are now four of the machines at work in the two retort-houses at Rotherhithe; and their regularity and expedition in operation, and the minimum of trouble since their installation constitute good ground for a certain amount of pride on the part of the inventors. And not only by them. How much they are esteemed at headquarters

was understood when almost immediately on entering the yard, one saw in various stages of construction, the first of a number of the machines destined for use at the Old Kent Road works. All the parts are made at Rotherhithe, even to the turning of the rams, in the well-furnished workshops, about which it follows the "juniors" saw much to interest their aspiring mechanical spirits. It was seen that since the publication in our pages, in October last, of the description of the machine (for which we were indebted to the "Co-Partnership Journal"), the modifications that have been made upon the original design are comparatively small, but they have had an augmenting influence on efficiency. For example (it will be remembered that the machine works by hydraulic power at Rotherhithe), there were formerly four glands on the ram; but the alterations have enabled two of the front glands to be discarded, so that there are now only two to be kept tight. An increased return speed has been obtained, and friction has been entirely obliterated. The means for supplying the feed water for the back stroke have also been simplified. Some experiments have been made with a pressure-gauge fixed at the back of one of the machines; and it was found, over a test of several days, that the pressure required, during the discharge of the retorts, was only 250 lbs. At the time, the pressure at the accumulator was 620 lbs. Another point is that the ram-head only comes in contact with the bottom of the retort once, and that is when it is fully extended; the weight bearing on the floor of the retort at the extreme end being then about 112 lbs. A further feature is that the ram-head is slightly rounded off; and this enables it to ride over fractures with the greatest ease. These points must be read in conjunction with the former article.

Leaving the workshops, the visitors inspected the working of the four rams in the two retort-houses—there being a ram on each side of the beneh in each house. The necessity for the two rams is occasioned by the feeding of the furnaces alternately with coke from the retorts on each side of the bench, and in order to utilize the coke-holes to the best advantage. It is probable that the advent of the ram, and its proved success, may have some influence on the future practice of the Company in the design of their furnaces and their arrangements for the disposal of the spent charges; but on this subject perhaps some day Mr. Charles Carpenter will enlighten an interested profession. It is seen that the rams work in company with Arrol-Foulis hydraulic charging-machines. The first house into which the members went, it was observed, contained 190 oval retorts, 22 in. by 15½ in. by 22 ft. from lid to lid, in settings of tens; and in the second (or No. 1) house 280 retorts similarly set, but only 160 retorts are working at present, the remainder having been let down for renewal. The maximum make of gas at this station is about 6 million cubic feet per twenty-four hours. The operation of the rams was witnessed on both sides of the bench; and we venture to think the ease, smoothness, and precision of their operation could not be excelled. In every case a clean sweep was made of the spent charges in the one projection of the ram; the time taken from entrance to exit of the ram-head in and from the retort only occupying from 15 to 20 seconds—a fair average being 18 seconds. Inquiry of Mr. Hunter elicited the fact that only occasionally do the charges block up the retorts through the operation of the ram; and this has only occurred in the retorts that have been somewhat knocked about in their long use, previous to the coming of the rams. The heavier the charge, too, the less liability is there to even this infrequent blocking. When it does happen, the hand rakes are brought into operation. The working witnessed and the explanations tendered by Mr. Hunter and Mr. Barnett as to the action and general behaviour of their machines gave the greatest pleasure to the visitors.

One other point of interest connected with No. 1 retort-house may be referred to here. There are no overhead hoppers for feeding the charging-machines. But the coal is brought into the works and fed into continuous bunkers along the sides of the house; the bottoms of the bunkers being provided with openings capable of regulation. Through these openings, the coal falls to the stage-floor, forming an even bank along the sides of the house. The charging-machines are each fitted with elevators, which pick up and feed the machines with coal from the side banks. The act of removing coal from the bank permits a further supply to automatically drop from the bunkers. So that, though the house will not allow of overhead hoppers, the coal is not touched by hand until the resulting surplus coke has to be dealt with.

From the retort-houses, the visitors passed to the engine-room. The most noticeable feature for explanation here was the high temperature of the gas in the exhausters, owing to the condensers being on the outlet of the exhausters. The average temperature on the inlet is from 140° to 145°. The gas passes to the water-condenser, where it is cooled down to within 2° of the water temperature, which just now is about 47°. The naphthalene is taken out in these condensers. It collects on the tubes. Tar admitted at the top washes it down; and it can be seen floating over the seal-cup in the well. The four Livesey washers, the scrubbers, the twelve purifiers (eight lime and four oxide), 6 ft. 9 in. by 20 ft. square, and the meter-house, were severally inspected. The gas-holders attracted attention, more especially when it was learnt that on one of them the primordial experiment was made of running the top lift beyond the framing. On the works there are three holders, and one a short distance away. The capacities of the three on the works are about 2 millions, 1½ millions, and a small one, rather (for the South Metropolitan Company) ancient in appearance, of 300,000 cubic feet. In all, top lifts extend beyond the framing. Some of the visitors also found interest in the jetty, with its hydraulic crane and grab equipment.

The visit gave much delight to the members of the Association; and their thanks to Mr. Hunter and Mr. Barnett were admirably voiced by the President (Mr. Grafton).

HEAVY MOTOR-WAGGONS AT THE AUTOMOBILE EXHIBITION.

THE field of the present-day gas engineer is so wide, and his requirements cover so extensive an area, necessitating such a considerable range of knowledge and of interests, that there are few exhibitions which will be found not to contain something of instruction and importance in the line of his own particular calling. The Automobile Exhibition, which was opened at the Agricultural Hall on Saturday, and which remains open till the 25th inst., is no exception to this rule; the chief items of interest being, of course, as far as our readers are concerned, the exhibits of heavy motor waggons and lorries. So important have these become that most of them are grouped together in the Minor Hall, thus facilitating inspection and comparison. The progress of this department of the motor industry is also indicated by the fact that there are now more than a score of such exhibits, and even a greater number of manufacturers who are in a position to turn out motor-waggons suitable for the transport of coal and the delivery of coke, &c.

Let us then briefly glance at the stands, and note a few of the distinguishing characteristics of these heavy vehicles. The first stand on the left of the Minor Hall is that of the well-known firm at Leyland, the Lancashire Steam Motor Company, Limited. They show one of their coal-carrying waggons, such as have been at work for some time at the Bournemouth, Preston, and other gas-works. Many improvements have been introduced since the first Bournemouth waggon; the boiler is now bigger, the axles are in Mannesmann tube, stampings have been substituted for castings, and the feed-water pump can be run while the waggon is stationary. Recently, also, they have brought out a Crossley-Leyland petrol-motor, for trade and other purposes; and an omnibus for London suburban traffic is exhibited. Fodens, Limited, of Sandbach, show a 5-ton steam-waggon, fitted with a multitubular locomotive type of boiler, with compound engine fixed on top. The "Manchester" steam-waggon, made by Messrs. Turner, Atherton and Co., Limited, of Denton. These proceed on the same principles as for horse traction, such as the driving effort being applied to the front wheels, which also serve for steering. A special feature of the Pickering lorry (petrol type), made by Messrs. F. G. Pickering and Co., Limited, of Tweedmouth, is a twin-spoke wheel, which, it is stated, "takes up side strain, and is not liable to collapse with a twist or a blow." Yet another 5-ton steam-waggon is that called the "Londonderry," manufactured by the Seaham Harbour Engine Works. At Stand No. 180 can be seen a 5-ton hydraulic tip-waggon, which for quickly discharging coal or coke would seem to offer considerable advantages. Its makers are Messrs. J. Robertson and Son, of Dock Street Engineering Works, Fleetwood. The hydraulic ram for tilting is actuated entirely from the driver's seat; and thus the extra man that is generally required where the tipping is effected by hand-screws is saved. This on a large tonnage should mount up to a considerable sum.

There are three firms from Leeds exhibiting waggons: Mann's Patent Steam Cart and Waggon Company, Limited, the Hunslet Engine Company, and the Yorkshire Patent Steam Waggon Company. The first-named vehicle is driven by spur gearing without chains; and the locomotive boiler is fired from the side. The second is a petrol-driven waggon; and the third is steam, which, as we have seen, is the generally adopted power, and certainly more suitable for gas-works purposes. It is usually acknowledged that, whatever may be the case as to pleasure motors, in the department of heavy motor vehicles British manufacturers more than hold their own. But a German competitive machine is exhibited by the N. A. G. (Neue Automobil Gesellschaft) Company of Great Britain and Ireland, Limited, with a 3½-ton 10 to 12 horse power petrol lorry.

We also noticed in the Great Hall other exhibitors of heavy motor-waggons—namely, the St. Pancras Ironwork Company, Limited, the Thames Engineering Works, and the Bristol Waggon and Carriage Works Company, Limited, all with steam-waggons, besides other firms with tractor engines. In addition to these motor exhibits, there are other stalls that are of particular interest to the gas engineer—such as Stand No. 21, on the left on entering, where Messrs. Kynoch, Limited, of Birmingham, are showing a gas-engine running on a gas-producer plant. Messrs. Crossley Bros., Limited, at Stand No. 37, also show a similar plant, with a combined engine and dynamo, working direct from a No. 2 suction-gas plant; the engine developing 11 brake horse power, as against 14½ brake horse power with town gas. The extreme simplicity and compactness of the arrangement were obvious; but as such plants have recently been described in the "JOURNAL,"*

* See Vol. LXXXV., p. 335, and Vol. LXXXVI., p. 437.

nothing further need be said here. The "National" and "Stockport" gas-engines are also on exhibition.

Altogether, therefore, it will be seen that this week's Automobile Exhibition is not without interest to gas engineers, especially to those considering questions of coal and coke transport. To-morrow (Wednesday) official visits will be made by borough and other engineers interested in municipal work.

OBITUARY.

Mr. R. M. Tweedy, who died at Falmouth last Wednesday, at the age of 70, was for twenty years Chairman of the Falmouth Gas Company—a position which he relinquished about five years ago. He was also a Director of the Truro Gas Company. For many years he was Manager of branches of the Cornish Bank at Redruth and Falmouth.

PERSONAL.

Mr. Chambers E. Allerton has been appointed Secretary of the Lowestoft Water and Gas Company, in succession to Mr. T. S. Allerton, deceased.

We have much pleasure in offering our congratulations to M. Troost, the Chairman of the Paris Gas Company, on his election as President of the Academy of Sciences.

In the "Journal" last week, we noticed the appointment of Mr. Frank A. Winstanley, of Rotherham, as Engineer and Manager of the Margate works of the Isle of Thanet Gas Company. During his residence at Rotherham, Mr. Winstanley has had an excellent opportunity of practically applying the experience he gained with his father at Newcastle (Staffs.); for, under his supervision, the gas-works have been remodelled, extended, and brought up to date. Referring to his work for the Corporation, the "Rotherham Advertiser" says: "It stands to his credit that, considering the great difficulties he has had to contend against—the over-capitalization of the concern, brought about by extensions that were imperative in order to meet the requirements of the town—the working of the undertaking has been so satisfactory. Whether or not the profits have been all that the ratepayers could have wished, the manufacturing results of the works have been exceedingly encouraging." Our contemporary congratulates Mr. Winstanley on having secured the appointment at Margate, and wishes him success in his new sphere. We are sure his professional friends will associate themselves with us in the expression of similar sentiments.

The Yorkshire Junior Gas Association will next Saturday pay a visit to the coke ovens and bye-product recovery plant of the Yorkshire Iron and Coal Company, Limited, at Tingley.

Japan and the Standard Oil Company.—According to the "Financial News," the Japanese Government are reported to have approached the Standard Oil Company for a loan of 10,000,000 yen in exchange for a lease of the naphtha fields in the northern districts of Japan. Our contemporary says on this matter: "Should the report be true, and the project be realized, the Company will be in a position to boast of an enormous progress on the international petroleum market. For, in the opinion of those interested in the industry and trade, the Japanese oilfields will ere long assume a preponderant importance on the Asiatic market, second only to the oilfields of the Dutch East Indies."

The Late Mr. James Somerville.—In the "Journal" for the 7th inst., we noticed the death of Mr. James Somerville, of Indianapolis. As he was an engineer from this side the Atlantic who had filled a responsible position on the other, a few particulars of his life, which are taken from "Progressive Age," may be read with interest: "James Somerville was born on April 1, 1840, near the village of Stow, on the banks of Gala Water, Scotland. At the age of 17 he entered the Greenwich Gas-Works, under his uncle, David Hunter, the Manager, to learn the business of gas engineering. Four years later he was appointed Inspector at the Maidstone Gas-Works. At the age of 23 he was sent to Calcutta to take charge of works. He remained in India three years, engaged in the construction of gas-works, and then returned to England, where he was married to a Miss Holliday, of Maidstone. He came to the United States in 1867, and after a few months' service with the New York Gas Company he was sent by an engineering firm to Knoxville (Tenn.), to rebuild and start the gas-works there which had been destroyed during the civil war. He remained as Manager of the works for ten years, and in 1877 went to Montgomery (Ala.), where for two years he had charge of the works. He then became Superintendent of the Indianapolis Gas Company—a position he held until his death. He was one of the originators of the Western Gas Association, and was President in 1877. He was recognized as one of the best gas engineers in the country; and the new gas plant in the north-west part of Indianapolis is conceded to be an evidence of his thoroughness in his profession. He leaves a widow (the above-named lady) and six children."

COMPETITION FOR THE SUPPLY OF POWER.

By J. Ferguson Bell.

The use of gas for power purposes has for many years possessed special attractions for me, and hence I willingly respond to your invitation to give my experience.

At Stafford, in 1890, the Corporation, upon my recommendation, reduced their charge for gas used for motive power by 4d. per 1000 cubic feet below that charged for lighting, with a differential scale according to consumption, with the result that this lower rate combined with the advantages of gas-engines being kept well in evidence, practically all the factories in the town gradually adopted gas-engines in preference to steam for power purposes. In 1900, the quantity of gas sold at the lower rate was 48½ million cubic feet—the greater bulk of which was used for power; and this upon a total gas consumption of 150 million cubic feet per annum. The public institutions, and gas used for heating and cooking purposes, where separate meters were fixed, were in many instances charged at the lower price; thus allowing one-third, or (say) 18½ million cubic feet for these (which is probably a liberal estimate), there remains 30 million cubic feet sold for power, which is 20 per cent. of the total gas sold.

In 1890, the competition of electricity and producer gas was negligible; hence the inducement in the matter of price, or rather the price charged for the gas used for power was not of the same importance as at the present time. The greater convenience, economy of space, cleanliness, and less initial capital outlay for gas-engines of small and moderate powers, as compared with steam, were all factors that ten or fifteen years ago had a much more important bearing than is the case now. The competition of electric motors, more especially for small power users, is becoming more severe each year; and now for the larger users of power we have the competition of pressure and suction-gas plants, which are not to be lightly set aside. Hence if town's gas is to hold its own and continue to be used for power to an increasing extent, it is the author's opinion that a difference in price will require to be made between gas used for lighting and power in all towns where the ordinary charge for gas exceeds 2s. per 1000 cubic feet—the rebate varying with the quantity used. The figures quoted indicate that a lower differential power price has a stimulating effect; and the price should be so reduced that the margin between running costs of working a producer plant or buying towns' gas may not greatly vary—care being taken that all the factors which make up the total are taken into account in each instance.

There is no doubt the facilities granted by many of those who supply electricity, in the way of hiring out electric motors on simple hire, which includes fixing free of any initial outlay on the part of power users, along with a special low price for current, has been the means of their introduction in increasing numbers in numerous towns; and it is evident various users of power are content to pay a higher sum for power obtained on these terms. And what is true with electric motors applies in like manner to gas-engines. It is a great convenience for users of power to be in a position to buy much or little as may be required, always in a state of complete readiness for use, of a gas specially suitable for power upon moderate terms, without the trouble and risk attending the generation of producer gas, with the necessary initial outlay for generator and space required for same. But users can only be expected to pay a reasonable increase in running costs for these conveniences, more especially the larger users of power, which the author is of opinion gas companies should endeavour to supply, as the cultivation of this class of consumers will be a means of considerably extending the consumption of gas and of greatly improving the load-factor, which is of much greater importance than many are fully aware of.

Makers of producer-gas plants are advertising that the cost of running by producer gas is only $\frac{1}{10}$d. per brake-horse-power per hour; but this generally is only part of the cost—being that of fuel only—and may with a poor load-factor be only a very small portion of the total cost. There is the men's time to be taken into account, attending, clinkering, &c., the producer, getting in coal, removing ashes and clinker, getting rid of the liquid products, which, although comparatively small, are difficult to deal with, unless run into the town drains, which gas manufacturers are not permitted to do. Again, there is the difficulty of starting, and much greater liability of stoppages owing to the variation in the quality of producer gas, unless special care and attention are given to its production—which, in the smaller installations, is hardly practicable—along with the engine being always greatly in advance of the power required. All these have a commercial value; and it is for those interested in the supply of town's gas to assess their value and not hesitate to make them known. The calorific value of well-made coal gas of 15½-candle power may be taken at 155 calories gross and 146·4 calories net; being 615⅞ gross or 581¼ net B.T.U. per cubic foot, which is 4 to 4½ times the value of ordinary producer gas, and may be 5 or 6 times its value, as it is well known producer gas, especially that made by means of small suction-producers, varies greatly in quality. It is at least the average, not the maximum, calorific value of both gases that should be taken as a basis for comparison.

Many makers of gas-engines have informed the writer that they much prefer to run on town's gas, as it is more cleanly and of uniform quality; and they seldom have complaints in regard

to the running of their engines where this gas is used. Such is not the case with producer gas. They bitterly complain that with few exceptions, until recently, no attempt has been made to encourage their use by way of a special price for gas consumed for power, or facilities granted for their introduction by means of fixing gas-engines on purchase hire to include necessary cost of fixing, &c. In a recent conversation with a large user of power and a well-known maker of gas-engines, the former informed us of the glowing accounts given to him by makers of gas-producers, and the latter replied, "You must live with the devil before you can know him."

The internal combustion engine has within the last few years greatly improved in thermal and mechanical efficiency. The cost of production has also been reduced, with the result that reliable gas-engines may now be obtained at a very moderate price, and are coming extensively into use for the larger sizes of from 50 to 250 brake-horse-power; and it will be the fault of those responsible for the supply of town's gas if they do not reap the harvest, owing to their negligence in not sowing the seed and cultivating the ground.

(*To be continued.*)

Presentation to Mr. James Dougall.

Last Tuesday evening an interesting and pleasing ceremony took place at the Margate Gas-Works, when Mr. James Dougall, the Engineer and Manager, was presented with a gold watch and an illuminated address by 115 officials and employees of the Company, as a token of their esteem. The presentation was made in the workmen's recreation-room, and the chair was taken at 5.30 by Mr. T. C. Fuller, the Secretary to the Company, who also made the presentation. He said they had met to show their appreciation of a gentleman who had been among them for the past seven years. Immediately it became known that Mr. Dougall had secured the appointment at Buenos Ayres, there was a unanimous and entirely spontaneous feeling that their appreciation of his many kindnesses towards them all should take some tangible form. A Committee was appointed, and it was decided that the gift should be a gold watch; and he understood that it was their wish that he should present it to Mr. Dougall, who during his stay among them had won the honour and regard of all those with whom he had come in contact. Speaking to the Manager, he said: "In presenting you with this watch, we hope that it will remind you of many happy days spent among us, and assure you that we shall never forget our kind and genial friend. We trust that your journey across the sea will be safe, and your future prosperous and happy." Mr. Dougall, in response, said he had great pleasure in accepting the gifts. He hardly knew how to express his feelings on an occasion like this. He must say, however, that during the seven years he had been with them he had received the greatest kindness from all; and he sincerely trusted that they would accord to his successor, Mr. Frank A. Winstanley, the same measure of support that they had given him. If they did this, the prosperity of the Company would be as great in the future as it had been in the past, and even greater. To Mr. Fuller and all he must tender his best and heartiest thanks for their kindness to him, which had culminated that evening; and he hoped, though he scarcely believed it, that his successor would have as good a time as he had had. He thanked them all for their good wishes for his future, and when he returned, as he hoped to do at the end of five years, for six months' furlough, he should look forward to seeing every one of them again. Mr. J. R. Sandwell and Mr. J. Kemp also addressed the meeting, expressing their regret at Mr. Dougall's departure, and wishing him and his family good health and prosperity in their new country. The meeting closed with the National Anthem. The inscription of the illuminated list was as follows: "Presented to Mr. James Dougall, together with a gold watch, on the occasion of his departure to Buenos Ayres, as a small token of the esteem in which he is held by the officials and employees of the above Company."

The output of sulphate of ammonia in Germany is rapidly increasing with the adaptation of the recovery process to coke-ovens. The Concordia Coke Company last year produced 3590 tons of sulphate, against 2745 tons in 1903; and the Consolidated Company 942 tons, against 887 tons.

The current number of our contemporary "Le Gaz" contains an obituary notice, with portrait, of M. Gustave Jouanne, its late Technical Editor, by M. Parsy, who has succeeded him in this position. With the view of increasing the utility of the publication, the number of pages has been doubled, and several new features have been introduced, not the least interesting of which are short extracts from foreign publications connected with the gas industry. M. Parsy was formerly Engineer of the Wazemmes Gas Company. He is a member of the Société Technique, and at the congress of the Society last year, he submitted three papers, one of them being a description of the setting of inclined retorts on the Derval system at the Nanterre Gas-Works. "Le Gaz" has been established forty-eight years; and it has attained a position among the periodicals devoted to the gas industry which there is every reason for believing will be fully upheld under the new management.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Members of this Association held their Monthly Meeting last Saturday, at the Manchester School of Technology, under the presidency of Mr. Harold Smith, of Bury, at which an interesting paper was read by Mr. D. V. Hollingworth, F.C.S., of Salford, on the subject of "The Chemistry of Carbonization."

The author commenced by explaining that the bulk of the material for the paper was gathered as early as 1901, when he was anxious to know exactly what takes place during the process of carbonization; and as no book he could procure was complete on this respect, he had made extracts from the works of many industrious authorities, and had endeavoured to put them together in a condensed and simple form. He then proceeded to explain the origin of coal, and to describe its chemical composition, as to which, he said, little was definitely known; but in the case of Lancashire coals the constituent elements might be taken as follows: C, 77·9; H, 5·32; N, 1·3; S, 1·44; and O, 9·53—the average amount of ash being 5 per cent., and of coke 60·2 per cent. This was simply the composition of coal, and gave no idea as to how the elements were combined, or even as to whether any of them were combined at all; and, so far as he had been able to ascertain, this was not definitely known. It seemed probable, however, that they were present in the free state. Carbon was undoubtedly so in the granular and amorphous condition; its amount having apparently some influence on the physical properties of the coal. With regard to the presence of the other elements, information was similarly very meagre.

The author then went on to say that, in considering his subject, he could start with the following data:—

(1) That coal contains certain elements the proportions of which are known, but the manner of whose combination is quite unknown.
(2) That resinous bodies of unknown constitution are present to the extent of about 4 per cent.
(3) That products are obtained from its destructive distillation whose composition and constitution are well known.
(4) That those products may be prepared by artificial methods which suggest themselves as likely to occur under every-day carbonizing conditions.
(5) That substances similar to coal of pure and definite constitution have been examined under the same conditions as during the destructive distillation of coal, and invariably yield certain results; and it is suggested by analogy the same reactions occur during the decomposition of coal as do during that of the known substance cellulose, &c.
(6) That known gases are occluded in coal.

He pointed out that, whatever the relations existing between the elements of which coal is composed, it is certain that the chemical equilibrium is such as to cause comparative stability at ordinary temperatures; and the first result upon it of the action of heat is to cause an alteration in the arrangement of these elements—*i.e.*, a destruction of the hitherto existing equilibrium. The coal is broken up into substances of less complex constitution but of greater stability at the new temperature. At the particular time when the heat of the retort upsets the equilibrium, several circumstances help to determine the character and the amount of the various products formed; among the most important of them being: The intensity of the heat, the amount of chemical affinity between the elements and compounds present, the volatility of the products, the speed of the removal of the gases, and in a lesser degree the thickness of the layer. The author gave a concrete example by taking a retort charged with a layer of coal from three to four inches thick, the adjacent setting being at a temperature of about 900° to 1000° C.

Having dealt in some detail with the products of distillation, the author went on to show that there is no process less under control than that of carbonization, and said that when the immense number of conditions in operation inside a retort are analyzed, this was not to be wondered at. First, there was the great variation in temperature at different periods of carbonization—for example, near the walls of the retort it might possibly be 800° C., whereas in the middle of the core it was only 400° C. At the higher temperature, the benzene and naphthalene series of compounds would be produced; while at the lower the lighter hydrocarbons would be first generated, only to be further altered as they came within the sphere of influence of the higher temperatures. Further, in many cases the temperature existing near the mouthpiece was hardly sufficient to more than partially decompose the coal. This, the author pointed out, explained the fact that the illuminating power of the gases evolved within a foot or so of the lid was always high; while the gases obtained from the centre of the retort, having to traverse a long distance over red-hot coke, and between the still hotter sides, became repeatedly decomposed, until the simplest gases alone remained undecomposed. This afforded the most favourable opportunity for the synthesis of those compounds which could very well be done without in the gas, especially naphthalene.

Mr. Hollingworth then gave a detailed explanation of the formation of the following substances in the carbonization of coal:

Retort carbon, paraffines and olefines, free hydrogen, carbonic acid and carbon monoxide, ammonia, sulphur compounds, benzene, and naphthalene; and then concluded his paper as follows.

Having touched on some of the reactions that are likely to occur during the process of carbonization, I will mention a few ideas which have come to me during the compilation of the paper. First, it was mentioned that some compounds absorbed, while others liberated, heat during their synthesis. Among those that give out heat we have CO_2, CO, CH_4, H_2S, and NH_3; those requiring heat being C_6H_6, C_2H_4, CS_2, and CN. Those giving out heat are greatly in preponderance; so that carbonization of coal actually liberates heat. When once started, the process would actually go forward without the application of external heat, provided that no heat was carried off by the gases or by the hot coke, and that radiation was entirely prevented. Now, though highly desirable, I do not for a moment wish you to think such a state of things possible; but I do think that the importance of keeping down the radiation as much as practicable should not be forgotten, and that much of the heat of the evolved gases might be utilized.

Secondly, we have seen that at all stages of the process there is an excess of hydrogen and oxygen together present in the retort; and at the finish we still get 50 per cent. of the coal remaining as free carbon, and about half the gas consisting of free hydrogen. Can no method be found of causing these two elements to combine in larger quantities? What a great increase in the illuminating power and calorific value of our gas would result if only half as much more were to combine to (say) ethylene and methane. Carbon is surely more valuable as a constituent of a gas than it is as coke; and although perhaps no more gas per ton would accrue, it would certainly be far richer and allow for much greater dilution with (say) water gas.

Thirdly, we have seen that benzene or naphthalene, anthracene, &c., result when ethylene or acetylene become polymerized; this latter being brought about by the great and prolonged action of heat. Now, benzene is generally considered to be a valuable constituent of coal gas; but I would rather be inclined to consider that it is much like "the big fish that exists by swallowing up all the little fishes." I mean that it is formed by the destruction of the valuable gases C_2H_4, &c. I would draw your attention to the fact that it takes three molecules of acetylene to produce one molecule of benzene, and that the latter does not occupy so much space, though it has as much weight, as the acetylene used, and even at this most of it is lost in the tar, since we sell gas by cubic measurement. Again, the conditions that are favourable to the production of benzene are also ideal for the formation of naphthalene, which to the gas maker is anything but a valuable constituent. I think, therefore, that if the process could be stopped before these bodies are formed, we should obtain both an increased make and richer gas. Such a state of things cannot be commanded under present conditions; but we should, I believe, be going on right lines if we strove to make gas under such conditions as to cause the coal and its products to be subjected to as uniform a temperature as possible. This temperature to be determined entirely by the class of results desired. To do this, means would have to be invented to carry off the products at the moment of their formation, and thus prevent polymerization or decomposition, which only results, as I have said, in the formation of less valuable compounds which are liquid or solid, and are lost in the tar.

At the close of the paper, the President remarked that the author had touched upon a number of points of a highly scientific character, some of which it was by no means easy to explain. Mr. Garlick also remarked that the subject was one which could not be dealt with off-hand, as it required consideration. He complimented Mr. Hollingworth on the character of his paper, and congratulated the members on having among them one who could produce such a contribution to their proceedings. There was very little discussion; but a unanimous vote of thanks was accorded to Mr. Hollingworth.

Mr. Doherty on the Question-Box.

In a letter in "Progressive Age," Mr. Henry L. Doherty refers to the subject of the Question-Box of the Ohio Gaslight Association. He says: "Over 2200 gas men have expressed great interest in this work; and hundreds of letters have been received urging that the work should be carried on, and enlarged upon, if possible. This year's Question-Box will contain over 4000 contributed answers to questions; and the work will cost upwards of $6000. I am aware of the fact that this work has been ridiculed and criticized by what might be termed the "upper crust" of the gas fraternity. But it has, however, proved of immense benefit to an immense number of the gas fraternity; and I cannot see that it has harmed anyone. In justice to those who formerly ridiculed and criticized it, I must say that the major portion have since become its warm friends, and many of them have co-operated in the work this past year. It is too big and too expensive for any of our present Associations to undertake without external support. No one has been asked to contribute directly towards these expenses. Advertising has been invited; but the advertising this year will fall far short of the expenses. The work, however, will be continued as long as the writer's time and finances will permit; and the scope of the work will only be limited by the funds available."

THE COMMERCIAL SIDE OF INCANDESCENT GAS LIGHTING.

At the Annual Meeting of the New England Association of Gas Engineers, a paper on "Gas-Mantles and Gas-Mantle Lamps, from a Commercial Standpoint," prepared by Mr. W. R. Addicks, the Vice-President of the Consolidated Gas Company, of New York, was read. The following are the principal portions of the communication.

Why should the gas engineer take his attention from the retort-house, distribution, or the contemplation of the subject of naphthalene, its cause and prevention, and waste his brain power on gas-mantles and gas-mantle lamps? The answer to this question is, to my mind, complete—you may not agree with me—when I say that there is no one subject that in the future means the earning of more money for your stockholders than from this one source. Well, how? The future will demonstrate that the principal source of all illumination will be the gas-mantle. You know that to-day those companies who give most careful attention to their consumers' flat-flame burners and troubles are apt to give the best satisfaction, and with the fewest complaints of poor gas and inefficient service. The poor gas-mantle is to the good one a smaller fraction than the poor flat-flame burner to the well-regulated efficient one. In other words, the importance of good mantles will be greater than the importance of good ordinary burners. This is why we should study the subject. Do not the electric light companies, in increasing numbers, care for lamp renewals? So, too, the gas companies must eventually take up the gas-mantle end of their industry.

Begin now and do it properly. Start with one man, if you please, to properly adjust and keep in repair mantle burners, supplying all needful mantles, supports, and glassware, and at the same time charge a profitable amount to compensate you for your trouble, time, and material, and keep books and accounts of the cost, charging all the items. What should your charge be? This is something that depends upon your local conditions.

You will find that a man of good ability can take care of from 40 to 60 four-mantle lamps per day, or 240 to 360 per week. I am inclined to the belief that the lower number is conducive to good service. If you pay $10 per week for labour, this would be (say) 4 c. per lamp per week, or 17⅓ c. per month. If you agree to supply as many as three mantles a month, and they cost you (say) 12 c. each, this item of cost would be 36 c. You have to take care as to billing the lamps, making out accounts, collecting, &c. Perhaps you had better allow nearly as much more labour for this item—say, 14 c. per month; so that you have another charge of 50 c. per lamp per month for labour and material.

Suppose your lamp costs you $6, and it costs you $2 to set it, including shop expense, the total is $8. Let us allow 5 per cent. for interest, the same for profit, and 20 per cent. depreciation on the lamp, including glassware, if you lease the lamp (otherwise when maintaining only 10 per cent. for repairs, including glassware), or a total of 30 per cent. on the first cost. This would be $2·40 per annum, or 20 c. per month, or a total, including maintenance and office charges, of 87 c. per month.

This does not allow anything for superintendence or insurance, taxes, payment of claims, bad debts, rent, or other charges that the business, standing as a business alone, must meet. You will find before the year is up that it is not easy to collect your bills in summer; and also, if you lease lamps, that you will have to remove many, that the expense of setting a lamp is lost to you, and that it must be charged to expenses. I do not advise anyone to lease lamps, with weekly inspection and cleaning, for less than $1 per month at the start. Do not deceive yourself by having labour put on this work, and say it does not cost anything.

All my previous remarks refer to lamps used within doors. I think you will find such lamps take as much as 1250 cubic feet a month, or 15,000 cubic feet per annum. If you should ultimately make in your maintenance department 40 c. per lamp per month, you will be receiving 480 c., or 32 c. per 1000 cubic feet on the gas sold by the appliance. If your lamp is a six-mantle one for outdoor use, I would not advise anyone to attempt leasing such lamps for less than $1·50 per month with weekly inspection. But these mantles are usually large, and the return on gas will be nearly double in quantity that of an indoor lamp. The cost of setting will be found to be twice that of an indoor lamp, and may be even greater. No rule can be laid down for any particular locality; it depends entirely on the cost of labour and material.

Single mantles may be maintained for less, perhaps, than cluster lamps; but I would prefer to consider them on the same basis. That is, if a four-burner lamp cost 40 c. per month, I would not advise considering less than 10 c. per month as the cost to the company, without profit, of single-mantle burners. If you lease lamps, do not have a cheap lamp in stock. Get a well-made lamp. Do not have more than one make of lamp, unless for commanding reasons; for then your spare repair parts will be less numerous.

While you may lease lamps, I would suggest that you should sell them, and maintain them for the purchaser at a profit. I would not recommend maintenance at less than 75 c. per month with weekly inspection, including glassware. If you lease, you run the risk of a new lamp making your leased lamps out of date.

I want to warn all who undertake this work that they must have a contract signed. It must be a good contract, and one that the consumer can readily cancel. All our contracts contain a clause that they can be cancelled at any time, if payments are up to date, by paying one-half the amount still due thereon. If you can, it is much better to get a payment for installation the first month, and make the payments $1 a month till they amount to a total of $12, and maintain it at least twelve months from the date of the contract. Thus: Supposing the consumer cancels his contract in three months—

Advance Payment Plan.

[Cash $2; one month maintenance, $1; total down, $3.]

	If Contract is Filled.		If Half Remainder is not paid.
Installation charge	$3·00	..	$3·00
Maintenance, 2 months	2·00	..	2·00
Still due, $7 ÷ 2	3·50	..	..
Total receipts	$8·50	..	$5·00
Expenses, three months' maintenance at 50 c.	1·50	..	1·50
Gross profit	$7·00	..	$3·50

Without Installation Charge.

[All payments monthly in advance.]

Maintenance, three months at $1	$3·00	..	$3·00
Still due $9 ÷ 2	4·50	..	..
Total receipts	$7·50	..	$3·00
Expenses, as above	1·50	..	1·50
Gross profit	$6·00	..	$1·50

This last item of $1·50 profit must pay for the installation and the repairs to the lamp, which means that you have probably made a loss in the operation.

If competition is sharp, you will have difficulty in getting paid $2 for the installation. You will find less competition in outside lamps than with inside ones.

I would again suggest that you should try the plan of maintaining lamps, but do not try to do it cheaply. Have your maintenance men nicely uniformed; have them supplied with a good kit, and keep up a good standard. Do not haggle about how many mantles you have to supply. Give good service all through, and charge fair prices for the service. You will soon find that strict inspection of your maintenance men is a necessity; and as a check on your customer, they must be supplied with a card for him to sign weekly.

A NEW ADJUSTMENT FOR GAS-EXHAUSTER REGULATORS.

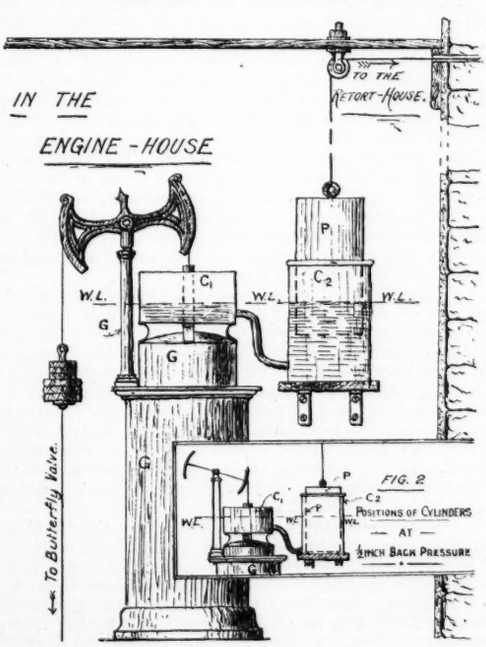
During the early part of last year, in order to obviate the necessity of workmen constantly leaving their hot retort-house labour and crossing the works in severely cold weather, Mr. T. E. Pye introduced at the Sandwich Gas-Works the method of controlling the exhauster workings from a distance which is here described and illustrated. The necessary appliance is exceedingly simple and inexpensive. It consists only of two small water cylinders or tanks, a plunger, and a cord, pulleys, and winding drum connecting the plunger to the point on the works from which it may be desired to operate the plunger and to control the vacuum on the retorts.

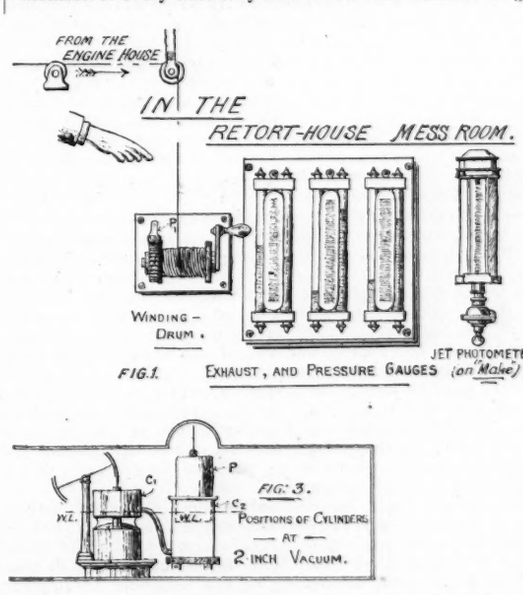
Fig. 1 shows the apparatus. G are the various members of the existing and well-known exhaust-regulating plant. C^1 and C^2 are the two cylinders referred to, one of which is fixed on the existing governor-bell. The cylinder C^2 is fixed close by, and is connected to C^1 by a sufficient length of flexible tube. In the cylinder C^2 a plunger works, which is operated vertically by means of the cord, travelling on pulleys, from the engine-house to the men's mess-room or to any other point desired, which may be 10 or 100 yards from the machinery, according to circumstances. At the far end of the cord is a winding drum, provided with a ratchet and pawl (P^1), as shown to the right of the illustration. When new plant is put down, the governor-bell and the cylinder C^1 are preferably constructed in one piece.

The working of the apparatus is as simple as its construction. Water is placed in the cylinders as indicated; and the flexible tube connection will maintain the same water-level in both cylinders. The plunger P may be simply another cylinder, full of water to give it weight, or it may be solid, and of any material of sufficient density to displace the water. It is by the manipulation of this plunger P that the apparatus is worked. As the plunger descends in the cylinder C^2, so the water therein is displaced. The bulk of the water so displaced naturally runs into the cylinder on the governor-bell C^1; thus adding weight to the governor-bell and opening the butterfly bye-pass valve, and reducing the exhaust on the retorts. Conversely, a pull on the cord, causing the plunger to ascend, allows the water in the cylinder C^1 to flow back again into C^2; the governor-bell being accordingly lightened, the bye-pass valve closed, and the exhaust on the retorts increased.

The winding-drum and ratchet are such that the movement of the handle to the extent of one tooth of the ratchet-wheel will effect an alteration on the vacuum gauge of one-tenth of an inch, *plus* or *minus*; the man in charge thus knowing—before he touches the handle—exactly how much he must turn it round. By suitably loading the governor-bell with water in C^1, in combination with the counterbalance weights, the apparatus may, once for all, be so arranged that the working of the winding-drum will effect alterations on the vacuum gauge ranging from 1-inch back-pressure to a vacuum of 3 inches. The varying positions of the respective cylinders, according to the desired effective "pull" on the retorts, is shown by the small-scale sketches of figs. 2 and 3. It will be observed that, in order to give the workmen every facility for constantly observing, without leaving their retort-house work, the prevailing pressures at various points on the works, and the illuminating power of the gas they are making, a series of gauges have been grouped, with a jet-photometer on the "make," on the mess-room wall, close by the winding-drum which operates the pull of the exhauster. Under normal conditions, the exhausting machinery is driven by a gas-engine provided with satisfactory self-feeding lubricators. There is thus no need for very frequent visits to the engine-house; and all the regulating of the exhauster-governor is effected at the other side of the works, in the retort-house, where the man in charge is chiefly engaged.

The principal advantage of the arrangement—which is specially designed for use in such small or medium-sized works as may be in the charge of one of the retort-house men—is claimed to lie in the fact that the exhausting can be perfectly controlled by the men at any desired distance from the exhausting machinery. In stormy weather, to which the men would otherwise have to expose themselves every time they had to alter the load on the governor





bell, it is, of course, a great boon; but in everyday practice this ready and prompt adjustment of the "pull" according to the make and quality, and to allow for the periodical opening of the retorts, is said to have resulted in an appreciably increased yield of gas, which is more uniform in quality. It also permits of working with a lower hydraulic seal—which has now been reduced to about ¼ to ½ inch, with the consequent formation of very little retort scurf—with all the attendant and indirect advantages. As already shown, too, the method of altering the load on the governor-bell is far better than the heavy dumping down of metal weights on the counterbalance or the governor-bell; and it allows of the most delicate adjustment of loading.

It may be mentioned that the manufacture of the apparatus has been placed in the hands of Messrs. George Waller & Son.

ECONOMIES IN THE RETORT-HOUSE.

By H. A. Carpenter, of Pittsburg (Pa.).

[A Paper read at the Annual Meeting of the New England Association of Gas Engineers.]

Scarcity of reliable labour and resulting high wages have, to an ever-increasing degree, stimulated capital and mechanical development to reduce the necessity of manual labour to a minimum, as well as to ease the burdens of those employed. From gas engineers the retort-house has claimed the most attention in this respect of recent years; modern installations having developed to a point of requiring an average of not more than one-third of the amount of labour of old-style hand-operated plants.

The great increase of capital invested per unit of capacity in the case of these labour-saving retort-houses, as compared with those on the old style, has been a perplexing problem, which has demanded the most exhaustive consideration of the engineers who have designed, and the investors who have furnished the money to build, such plants. Attempts have been made in every possible direction to increase the efficiency of these installations; and the results of such attempts, abroad and at home, are sufficient to illustrate the attending dangers and possibilities.

I believe it is generally understood to-day that it does not pay to attempt to save, in the case of a coal-gas plant, by cutting down the expense of any mechanical devices, especially coal and coke handling machinery. Some modern plants have been failures from the excessive cost and the time lost in the maintenance of such machinery; while the most successful plants have high capital charges in this respect, but low cost of operation and maintenance.

To materially increase the ability of the retort-benches to make gas is perhaps the most attractive plan to reduce the capital invested per unit of capacity of the retort-house. Much has been attempted in this direction; but the limit of endurance of the fire materials available has been the controlling point. In order to operate inclined or machine-stoked horizontal retorts to the best advantage, the retorts must maintain their shape and alignment. More refractory fire material and stronger settings of retorts are required for the same service than in hand-stoked retorts.

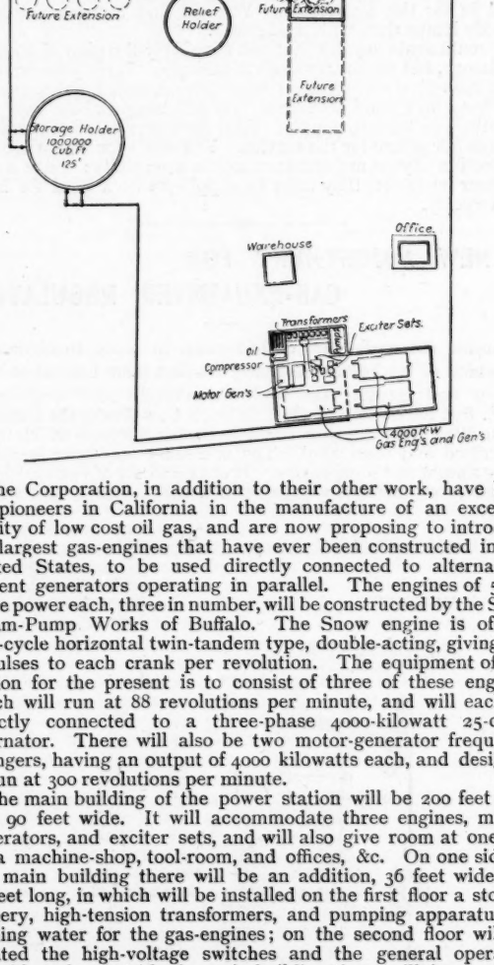
In a modern retort-house of from 2 to 3 million cubic feet capacity per 24 hours, the cost of the fire materials is about 10 per cent. of the total investment, including the ground occupied. Let us assume that the cost of renewing the settings amounts to 3 per cent. of the total investment of the house, and requires the benches to be out of use for 90 days. Let us further assume, for the sake of comparison, that the best work to-day amounts to 40 lbs. of coal carbonized per effective lineal foot of retort (16 in. by 26 in. or smaller) every four hours; and at that rate the retorts have a life of 900 days. This size of retort can easily accommodate a charge 50 per cent. greater, or 60 lbs. per lineal foot, which, at the same rate of working, would take six hours to carbonize.

Let us consider, in the case of retort-houses which are operated to the full capacity all the year round, or in any house for its maximum make, what the effect will be if we are able to force the retorts to carbonize the heavy charge of 60 lbs. per lineal foot in four hours, thus increasing the capacity of the benches 50 per cent. Even though we assume that this forcing would reduce the life to one-half, or 450 days, on the basis of 10 per cent. per annum for interest and repairs, and taking into account the time required for resetting the benches, as well as the fact that each retort in the latter case would during its life make 25 per cent. less gas than in the former, the cost of gas from these charges would be 16 per cent. less per unit of capacity than on the 40-lb., four-hour, 900-day basis. If it were possible, by doubling the assumed cost of fire materials in the retort-house, to produce retorts and settings which would carbonize the 60 lbs. per lineal foot with four-hour charges for 900 days, then the interest and maintenance charges would be 26⅔ per cent. less per unit of gas made than on the first assumption.

Other charges might be required to meet this additional increase in the capacity of the retort-house, such as the capacity of the coal and coke machinery, gas off-takes, &c.; but the added amount of capital from these items would be very small compared with the great advantage of the foregoing assumption. Evidently we can afford to pay very much more for fire materials, if by so doing the capacity of the retort-benches can be substantially increased.

A LARGE GAS-ENGINE POWER PLANT.

The California Gas and Electric Corporation, whose high-pressure system of gas distribution was described last year in the "Journal" for Sept. 27 (p. 885), have recently entered into a contract with the United Railway Company of San Francisco to supply the electricity for running the entire street railway system under the control of the Company. Current will be supplied normally from the hydro-electric transmission system; but to provide against interruption of service, it was considered desirable to arrange for the installation of an auxiliary power plant to pick up the load quickly, if necessary, and so ensure constant service to the street railway company. Steam engines and turbines were considered; but the fact that they require their boilers to be under constant fire for immediate operation, was thought to involve too much attendant expense. The engineers therefore decided upon the introduction of large gas-engine units, which are ready for instant use, and with which the interest on the cost of the engine plant is the only fixed expense. The following particulars of the installation, with the plan of the plant, are taken from "Engineering Record."



The Corporation, in addition to their other work, have been the pioneers in California in the manufacture of an excellent quality of low cost oil gas, and are now proposing to introduce the largest gas-engines that have ever been constructed in the United States, to be used directly connected to alternating-current generators operating in parallel. The engines of 5333-horse power each, three in number, will be constructed by the Snow Steam-Pump Works of Buffalo. The Snow engine is of the four-cycle horizontal twin-tandem type, double-acting, giving two impulses to each crank per revolution. The equipment of the station for the present is to consist of three of these engines, which will run at 88 revolutions per minute, and will each be directly connected to a three-phase 4000-kilowatt 25-cycle alternator. There will also be two motor-generator frequency changers, having an output of 4000 kilowatts each, and designed to run at 300 revolutions per minute.

The main building of the power station will be 200 feet long and 90 feet wide. It will accommodate three engines, motor-generators, and exciter sets, and will also give room at one end for a machine-shop, tool-room, and offices, &c. On one side of the main building there will be an addition, 36 feet wide and 80 feet long, in which will be installed on the first floor a storage battery, high-tension transformers, and pumping apparatus for cooling water for the gas-engines; on the second floor will be located the high-voltage switches and the general operating switchboard. Outside the main building there will be arranged storage and other tanks and apparatus for the cooling water for the engines.

In connection with the gas-engine station, there will be an oil-gas plant, consisting of generators, 16 feet in diameter by 18 feet in height, connected to superheaters, 16 feet in diameter and 40 feet high, as well as specially designed wash-boxes for removing the bye-product, lamp black. The works will be fitted with scrubbers and two relief gasholders, each having a capacity of 200,000 cubic feet. There will be four cylindrical purifiers, 30 feet

in diameter, as well as a storage gasholder of a million cubic feet capacity.

The plans of the works are now finished and construction work is about to begin. The site selected is in San Mateo County, a distance of about 4½ miles from the centre of the business district of San Francisco, and is particularly ideal, being located on the bay of San Francisco, where oil can be readily delivered, and where salt water for all purposes in the manufacture of gas can be obtained in unlimited quantities. The low cost of crude petroleum in California makes it possible to produce a gas of high heating value at a cost which is impossible in many other parts of the country. It is the endeavour of the Corporation to complete the gas plant by Sept. 1 next; and the managers hope to have one of the engines installed by that time, and the complete installation finished before Jan. 1, 1906.

The construction of the power plant, including buildings, and the gas-engine units, together with the high-potential transmission lines, which will connect the power station with the seven water-power plants of the Corporation, will be in charge of Mr. F. G. Baum, the Transmission Engineer of the Corporation. The erection of all the gas plants and all their equipment will be in immediate charge of Mr. E. C. Jones, the Gas Engineer, who was the author of the paper descriptive of the Corporation's high-pressure system to which reference has already been made.

REGISTER OF PATENTS.

Valves for Controlling the Flow of Gas through Purifiers.—Redman, T., of Bradford. No. 4533; Feb. 24, 1904.

This invention has for its object to arrange and combine the parts of valves so that the current of gas through the main pipe to the purifiers may be made to flow through in either direction, and thus, "by being able to reverse the flow of gas current, to more effectually utilize the purifying agency deposited in the box;" also to arrange the valves so that the flow of gas may be entirely cut off from the purifying box and continued direct through the main pipe—thus forming a bye-pass in the valve—or, when necessary, to close and stop the flow through the main supply pipe.

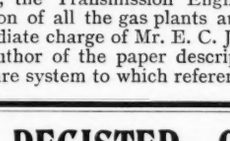


Fig. 1.

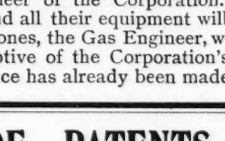


Fig. 3.

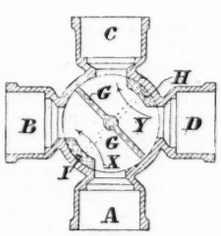


Fig. 2.

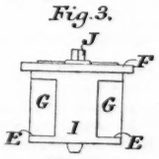


Fig. 4.

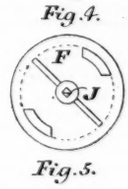


Fig. 5.

Fig. 1 is an elevation of the valve-casing. Fig. 2 is a sectional plan of it, fig. 3 a sectional elevation, and fig. 4 an elevation of the valve shell or plug. Fig. 5 is a plan of the top disc plate covering the centre

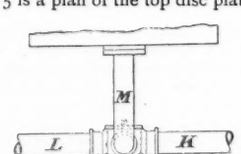


Fig. 6.

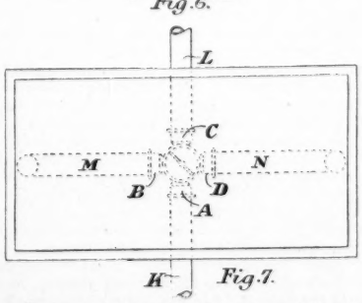


Fig. 7.

or moving compartment of the valve, fig. 6 an end view of a purifying box with the valve and connecting pipes coupled to it, and fig. 7 is a plan drawn at right angles to fig. 6.

The valve casing (provided with branches A B C D, adapted for pipe connections) is truly bored, either parallel or conical, for the reception of the operative shell portion of the valve. This is somewhat in the form of a plug, provided with a circular bottom disc plate E, and a cover disc plate F. It is made to fit the internal circumference of the valve casing; the discs being connected by a central midfeather G, and by the two cover plates H and I. A projection J at the top affords means for rotating and placing the plug in the position required. Raised portions on the upper surface of the disc plate correspond in position to the midfeather and shutters, so as to indicate the position of the latter within the casing in relation to the branches.

On utilizing the valve in connection with purifying boxes, one valve is required for each. Suppose the branches A and C are connected to the ordinary main pipes K L, conveying gas from the retorts to the holder, and the branches B and D are connected to the inlet M and outlet pipe N respectively of a purifier box, as figs. 6 and 7. The branch B is connected by the pipe M to the usual inlet, and the branch D by the pipe N to the usual outlet of a purifier, in which case the gas flowing through A passes in the direction of the curved arrow X to the branch B, and through the connecting pipe to the purifier, thence permeating upwards through the "purifying agency" to the top of box; the gas escaping through the pipe N to the outlet branch D, into and through the valve casing in the direction of the arrow Y, to the branch connected to the pipe L—a continuation of the gas-main on the opposite side of the valve.

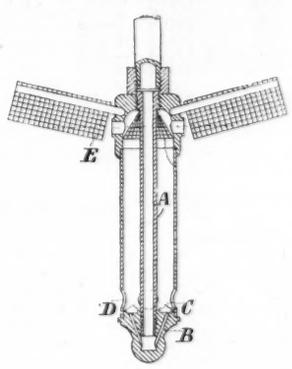
To more fully utilize the "purifying agency," and thereby work for a longer period without having to empty and recharge, the patentee would turn the plug from the position shown by full lines to that shown by dotted lines in fig. 2. In this way, the direction of the gas flow from the main K through the purifier is reversed and delivered to the upper surfaces of the "purifying agency" within the box. The crude gas, descending, permeates the material in a downward direction, "thereby effectually using and exhausting its efficiency, and to this extent prolonging the time required between one changing and another."

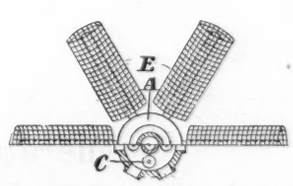
When it is necessary for the branches leading to and from the purifying box to be closed, the plug is moved so that the cover plates H I are opposite the branch openings—the midfeather G in that case being in line with the branch openings A and C, leaving a direct way through the main pipe K and the valve; and by moving the plug so that the cover plates close the openings through the branches A and C, the main is closed.

Gas-Burners for Incandescent Lighting.—Kitchen, J. G. A., of Lancaster; No. 6688; March 19, 1904.

This burner is made with a central mixing-chamber having primary air inlets and gas-nozzles at the base, and at the top several radial openings forming burner or flame nozzles. Above each flame-nozzle is a slightly inclined radial support of refractory material upon which a tubular mantle lies along its entire length in such a manner that the flame, when directed through it longitudinally, heats it to incandescence.

In the burner represented, the mixing-chamber consists of a crown or cap of metal, steatite, or other refractory material carrying the flame-nozzles and mantle supports and a lower part formed by a metal tube. The upper part has six radially arranged nozzles or orifices for the flame, perforated rectangularly. It is screwed upon a socket which in its turn is screwed upon the depending end of the gas supply-pipe. The socket is formed with a tubular extension A screw-threaded at its lower end. Upon this end a cap B is fixed, so that it can be easily taken off. The cap is formed with a flanged disc entering into the tubular





part, and is perforated with several small holes extending from the upper surface of the disc to below the tube A. The upper end of these perforations is enlarged and fitted with pin-hole nozzles C, from which the gas descending in the tube A will issue into the mixing-chamber. The tube is provided with air inlet holes D, preferably a hole opposite to each nozzle, and is clamped by means of the cap B between it and the nozzle part, into which it fits. This arrangement allows the cap B to be easily taken off for cleaning the gas-nozzles C without disturbing the upper part of the burner.

Immediately above each gas-nozzle a carrier is arranged for supporting the incandescent mantles E. These carriers consist of rods (made,

as usual, of refractory material and thin, so as to be readily heated and not to obstruct the flame) inserted into holes in the crown, arranged so that the flame jets issuing from the nozzles first strike the lower internal surface of the mantles, and, being deflected therefrom and spread as their force of impact is spent, heat the whole mantle and support to incandescence.

Concerning his arrangement, the patentee states: "By this construction of burner and arrangement of mantles in relation thereto, I obtain a concentrated light of great brilliance in a small compass, which is the chief characteristic. In the average application of burners for lighting purposes, the pressures of gas obtainable are generally about one inch of water, by which the length of flame with a workable volume is limited. I wish to retain a single flame for rendering each mantle incandescent. I have therefore to employ a short, fat flame, and mantles of suitable proportions to suit same. By slightly deflecting the flame from the axis of the mantle, the lower portion gets heated first; and the effect of the tendency of the flame to rise without properly heating the lower surface of the mantle is counteracted."

Lanterns for Street Lighting.—Bennett, C. V., of Herne Bay. No. 9189; April 21, 1904.

This invention refers more particularly to lanterns for public incandescent gas lighting in exposed positions, but it is also applicable for incandescent gas lighting generally, in draughty places and also for ordinary flat-flame lighting in exposed draughty positions—see "JOURNAL" for Feb. 14, p. 428.

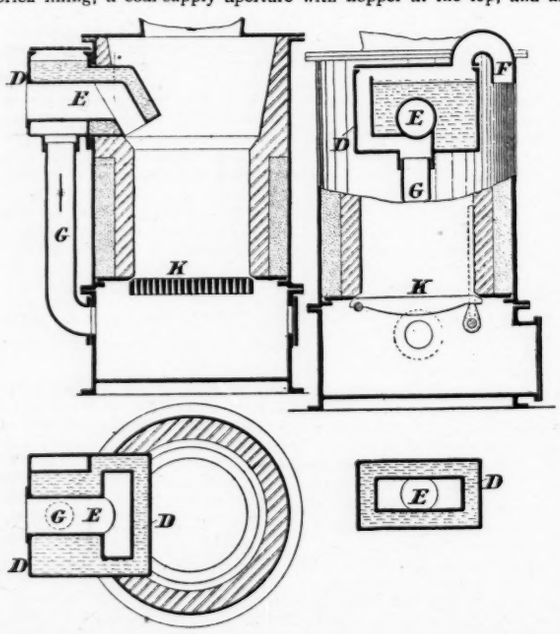
Gas-Producers.—Whitworth, I. W., of Chorlton-cum-Hardy. No. 7079; March 24, 1904.

This invention specially relates to producers for supplying gas for gas-engines or wherever a constant production and supply of gas are needed.

Gas-producers of this type have, says the patentee, been made with an annular steam generator placed over the producer just above the level of the gas exit, and embracing the whole of the fuel at that point.

This form of generator, however, presents such a large heating surface to the radiation of the incandescent fuel, as well as to the hot gases generated, that the quantity of steam generated therein when the producer is working at its maximum capacity is such that, when the air for supporting combustion in the producer is drawn or forced over the surface of the water in the generator, the amount of steam carried forward is so great as to cool the furnace below the temperature at which steam is broken up into its component parts—thereby impairing the proper action of the producer. To obviate this fault, he proposes a steam generator with a smaller surface presented to the radiation of the incandescent fuel and with a medium length of passage for the hot gases generated to pass through—thereby taking up a good part of the heat from the hot gases.

The producer is of ordinary annular or cylindrical form with a fire-brick lining, a coal-supply aperture with hopper at the top, and an



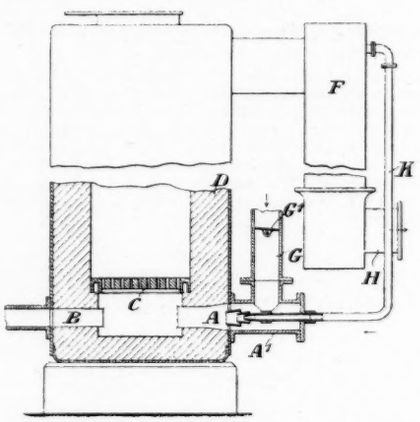
enclosed ashpit at the bottom. At the top of the producer body, a small steam generator D projects on to or over the fire-brick lining. The generator is constructed with a horizontal gas outlet passage E, preferably through its centre and inclined downwards at the inner end towards the furnace. The passage is surrounded with water; and through it all the hot gases from the producer are conducted to a scrubber (not shown); the heat from the gases being given up to the water in the generator. A steam space is provided at the top of the generator open to the atmosphere, and there is an outlet passage at one side. An air inlet-pipe or passage F enters the steam space, and a pipe G connects the outlet to the closed ashpit below the fire grate K.

This grate is supported by a hinge or pivot at one side, and at the other side by a cam or eccentric on a shaft placed inside the ashpit, so that it can be lowered at one edge or tilted to facilitate the removal of large clinkers from the fire through the gap or space formed between the fire-brick lining and the grate.

In operation, the gases from the producer pass out through the passage E in the steam generator, and air is drawn in through the air inlet passage into the steam space, where the steam and air are mixed. The air and steam together pass through the side passage and the pipe G into the closed ashpit, from which it passes up into the producer furnace in the desired proportions.

Suction Gas Producers.—Gerdes, H., of Berlin. No. 10,344; May 5, 1904. Date claimed under International Convention, May 6, 1903.

In connection with apparatus of the class mentioned, the patentee points out that it has been found advantageous in practice to allow the steam and air mixture to enter the producer at a slightly higher pressure than that generally present in the producer. This practice, although advantageous in the production of gas, has the drawback that a certain amount of danger is involved in case the motor does not draw off the gas evenly. Thus, for instance, if the amount of work to be performed by the motor is suddenly reduced, the suction periods will become less and irregular, in that the motor does not require so much gas, and the steam and air mixture continuing to enter the producer might develop pressure therein. The object of the present invention is to avoid this danger and to provide means for preventing the accumulation of pressure in the producer even when the motor has been stopped. With this object, an opening or outlet is provided in the producer below the grate, so that, in the event of the suction periods becoming irregular, or if the suction ceases altogether, the superfluous steam and air mixture will flow off below the grate into the open air. Any superfluous gas which may be generated in the producer will also pass down through the grate, and, mixing with the steam and air, will ignite there and pass out at the opening or orifice provided without causing explosions or endangering the apparatus.



The accompanying illustration shows part of the producer with the invention applied thereto.

The producer may be of the ordinary type, from which the gas passes out at the top to the cooling apparatus F, and thence, through the pipe H, to the point of combustion or consumption. In the cooling apparatus for the gas, the steam for its production is produced in the well-known manner and conducted, by the pipe K, to the injector A, arranged within a pipe in communication with the air-feed pipe G, through which the air is conducted to the injector. The amount of air fed may be regulated by means of a valve. Beneath the grate an outlet opening B is provided; and through this opening the superfluous steam and air mixture coming from the injector can escape. If any superflous pressure accumulates in the producer, the gas will be forced down through the grate, and, combining with the steam and air mixture there, will be burnt, and will then escape at B with the steam and air.

Simultaneously Igniting and Simultaneously or Successively Extinguishing Gas-Burners.—Candi, O. & C., of Genoa. No. 20,953; Sept. 29, 1904.

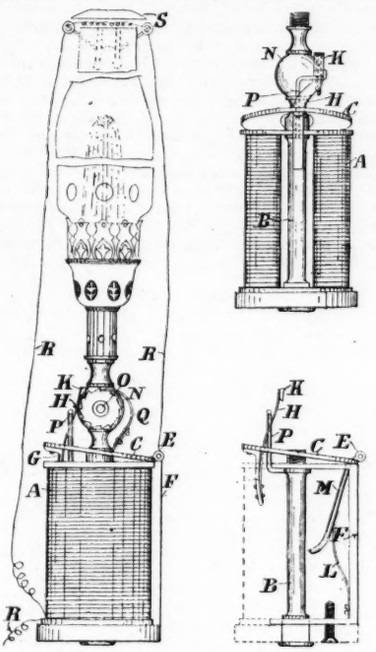
The apparatus forming the subject of this invention is shown (p. 775) in elevation as applied to an incandescent gas-burner, in a side view of the mechanism for opening and closing the gas-cock with the electro-magnet removed, and in end view showing also the electro-magnet and gas-cock. It comprises a cylindrical electro-magnet A, through the centre of which passes a pipe B for the passage of the gas from the main. The armature of the electro-magnet consists of a disc C, having an oval aperture D to permit of its movement. It is hinged at E on a post F, secured to the side of the magnet. Attached to the underside of the disc is an angle-piece G, to which is fixed an arm H of resilient material, provided at its free end with a lug K, so that when the armature is attracted by the electro-magnet, the lug K is moved downwards, and when the electric circuit is broken, the armature and lug are again raised by the action of a spring L, secured inside the electro-magnet and acting upon an arm M attached to the lower surface of the armature.

The plug of the burner-cock N carries externally a small wheel O provided with twelve peripheral ratchet-teeth, with which co-operates the lower edge of the lug K, which is bevelled for this purpose. The lug being in contact with one of the ratchet-teeth of the wheel, and the armature being attracted by the electro-magnet energized upon the passage of a current, the downward movement of the lug causes the wheel to be rotated for about a quarter of-a-revolution, whereby the cock is opened for the admission of gas to the burner.

In order to prevent the lug from being laterally deflected and disengaged from the wheel, the arm H, carrying the lug, is guided by a rod P, secured to the pipe B; while a spring or pawl Q, attached to the lower end of the cock N, prevents the wheel from being moved backwards.

The gas admitted to the burner is ignited by means of a platinum coil S inserted at any convenient point in the circuit formed by the wire R.

The action of the apparatus is as follows: A current of short duration passing through the circuit, the electro-magnet will be energized and attract the armature C, whereby the lug K is moved downwards, causing the wheel O to be rotated for about a quarter-of-a-revolution and open the cock N; while the coil S is brought to a red heat to

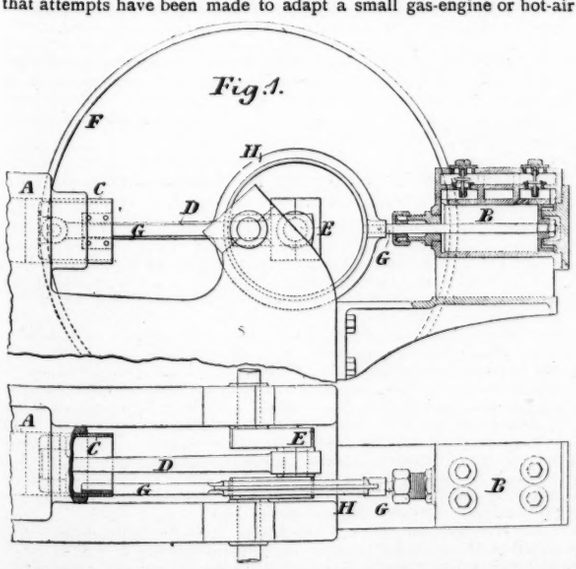


ignite the gas flowing from the burner. The circuit being broken again, the armature C is again moved upwards by the action of the spring L, whereby the lug K is also raised without rotating the ratchet-wheel. When it is desired to extinguish the burner, a second current is passed through the circuit, whereby the ratchet-wheel, and consequently the cock N, is again rotated for about a quarter-of-a-revolution in the same direction, so that the cock will be closed and the burner extinguished.

When it is desired to extinguish only a certain number of burners at one time, the burners intended to remain alight are provided with cocks, the plugs of which have a passage the diameter of which is double the diameter of ordinary cocks. Thus, when a first extinguishing current passes through the circuit, the burners provided with the ordinary cocks will be extinguished while the others remain ignited, until, at a given moment, a second current passes through the circuit, causing the cocks to be rotated through a second quarter quadrant in the same direction as previously, so that they will be closed.

Compressing Gas.—Sugg, W. T., of Westminster. No. 24,986; Nov. 17, 1904.

Before describing his apparatus for supplying gas at a higher pressure than the normal for incandescent lighting, the patentee remarks that attempts have been made to adapt a small gas-engine or hot-air



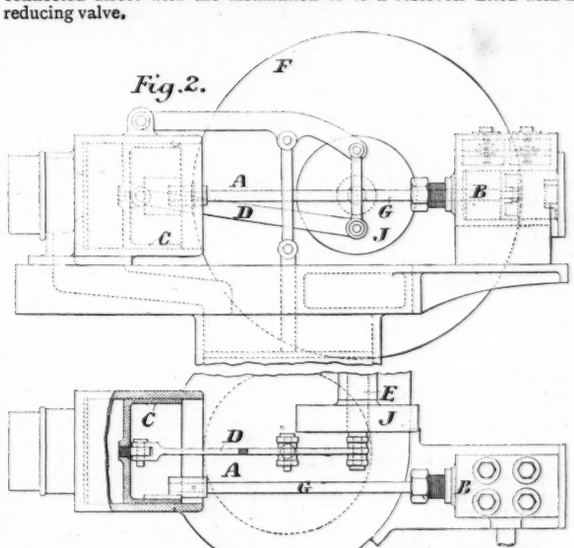
engine for the purpose; but the connections between the engine and the pump have hitherto been of such a complex character as to stand in the way of general adoption—the apparatus being liable to continual derangement. The complexities have, he says, principally arisen owing to an idea that it would be impossible to work the pump at the same speed as the engine, and that therefore intricate means must be provided to reduce the speed of the pump in relation to that of the engine; and he claims to have discovered that this is quite unnecessary, and that no detrimental effect follows from working the engine and pump at the same speed—a fact which enables the complicated devices above referred to to be dispensed with.

The piston-rod of the pump is connected direct to the piston of the engine; the piston being preferably of the bucket type, "which lends itself more conveniently to the purposes of this invention."

Fig. 1 is a side elevation of the gas-engine arrangement with the pump in section, and a plan, with the piston and cylinder partly in section.

Fig. 2 is a side elevation of the hot-air arrangement, and a plan, also with the cylinder and piston partly in section. A is the engine; B, the pump; and C, the piston—the latter being of the bucket type in both engines.

In fig. 1, D is the piston-rod of the engine, which is connected with the crank-axle E of the fly-wheel F. G is the piston connecting rod of the pump, which is in a plane parallel to that of the piston-rod D and is rigidly attached to one side of the bucket piston C. As the rod G will be in the path of one crank-arm, a circular loop or ring H is provided in the length of the rod, so as to encircle the crank-arm and allow the latter to rotate within it. By this arrangement, an exceedingly steady motion of the pump is said to be obtained; and it may be connected direct with the installation or to a reservoir fitted with a reducing valve.



Referring to fig. 2, the piston-rod G of the pump is connected to a projection on the bucket piston C of the hot-air engine. As in this case there is no crank-axle to get round, the ring H is unnecessary; but the piston-rod G will, as before, be in a plane parallel to that of the piston-rod D, which in this case is connected to a crank-pin on a disc J arranged at the side opposite to the pump-rod and in connection with the link-motion of the engine.

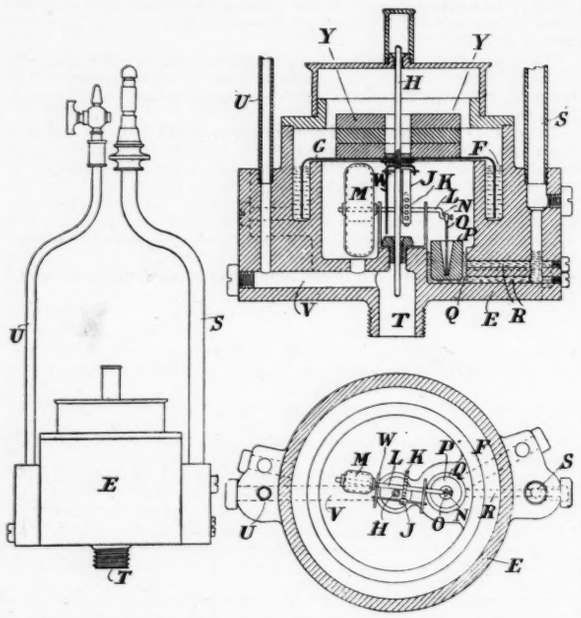
Automatically Lighting and Extinguishing Street and other Gas-Lamps from a Distance.—Bruce, J. L., of Kogarah, New South Wales. No. 26,680; Dec. 7, 1904.

This invention relates to a device by means of which gas-burners provided with pilot lights can be lighted or extinguished from a distance, by increasing and decreasing the pressure of gas in the mains. The essential feature of the invention is a mercury valve which controls the gas supply, and is operated by the rise and fall of a gasholder bell or its equivalent actuated by predetermined variations of pressure in the main. The operation of the valve may be obtained either by the direct action of the holder bell or by suitable intermediate mechanism; and the form of the valve may be either a small mercury sealed bell or a displacer plunger immersed in mercury.

There are many suitable intermediate mechanisms that might be used to operate the valve; two forms found in practise to be simple and effective are described by the patentee. The one illustrated consists of an outer casing containing a small holder, the bell of which seals in mercury. Within the gas-chamber, and beneath the bell, is a horizontal shaft supported on bearings. One end of the shaft is cranked and carries depending from it a plunger which lies within a mercury well, so that by the rise and fall of the plunger the level of the mercury is lowered or raised. The other end of the shaft carries a weighted tumbler consisting of (preferably) a closed oblong vessel partially filled with mercury, shot, or the like. At or near the centre of the shaft is a ratchet-wheel securely keyed to it. Depending from the inside roof of the bell, and attached to it in such a position as to engage the ratchet-wheel, is a vertical rack.

The action of the apparatus is as follows: Assuming that the bell has been weighted—either by dead weight as shown, or by springs—to lift at a predetermined maximum pressure, and that the light is out, the pressure in the main is first reduced to a predetermined minimum. This causes the bell to descend into the position shown; the rack, of course, riding over the teeth of the ratchet-wheel without engagement. The pressure is then increased to the predetermined maximum at

which the bell will rise; and as it does so, the rack attached to it engages the ratchet-wheel on the underlying shaft which carries the plunger, and causes it to revolve a quarter-of-a-revolution. The mercury contained in the tumbler will then transfer itself to the other end, and so aid the rack and ratchet-wheel in completing a half-revolution of the shaft, and retain the parts in the position reached till again moved by the next rise of the bell. The half-revolution of the shaft will raise the plunger out of the mercury well sufficiently far to lower the level of the mercury, and open a passage for the gas to pass to the burner.



E is the main body of the apparatus; F, an annular channel containing mercury; G is the bell; and H is a vertical spindle attached to, and passing upwards and downwards through, the bell for the purpose of vertically guiding it in its rise and fall. J is a hinged rack depending from the bell in such a position as to engage the ratchet-wheel K. L is a horizontal shaft supported on suitable bearings. M is a weighted tumbler preferably consisting of an oblong vessel partially filled with mercury. It is fixed to one end of the shaft, the other end of which has a crank N, to which is pivotally attached a small rod O carrying the displacer plunger P. W is a guide provided to prevent the bell turning. Q is a mercury well in which is immersed the plunger. R are gas-passages leading from the mercury well to the burner supply-pipe S.

When the plunger P is raised by a half-revolution of the shaft L, caused by the rise of the bell, the level of the mercury in the well Q falls, and the mercury in the upper passage R flows therein—thus opening a passage for the gas to the burner supply-pipe S, and the gas-lights. Y are weights on top of the bell.

The falling of the bell, owing either to a predetermined or to a normal lowering of the pressure in the main, will have no effect on the supply to the burner, as the rack J rides over the ratchet-wheel K; but when the bell rises again, as the result of the raising of the pressure in the main to a predetermined maximum, the rack engages the ratchet-wheel and, aided by the tumbling weight M, causes the shaft L to make another half-revolution, which immerses the plunger P in the mercury in the well Q, thereby raises its level, fills the passages R, and cuts off the gas supply to the burner. Different channels with suitable screw-plugs are provided for the purpose of clearing the passages from obstructions, and filling and emptying the mercury seals when desired. Connection with the gas-main is made at T; the pilot-light U being in communication with the gas supply through the channel V.

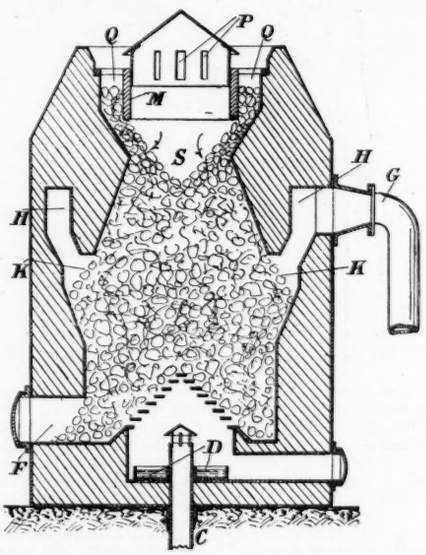
Manufacture of Power Gas.—Fleischer, E., of Dresden. No. 26,770; Dec. 8, 1904. Date claimed under International Convention, Dec. 11, 1903.

This invention relates to the manufacture of power gas, in which air is drawn into a generator from above and from below, while the combustible gas produced is drawn off laterally through an exhaust pipe opening into the apparatus about midway of its height. It has for its object to enable the employment in such generators of bituminous fuels, lignite, sawdust, and other combustible materials the use of which has hitherto been deemed impracticable for power-gas manufacture.

The patentee points out that, in suction gas-generators of the type specified, the gases are exhausted or withdrawn through an annular channel, on about the level of the middle height of the charge, which remains unobstructed, debouching into an inclined channel which extends downward and inward towards the charge, so that all the gas generated is free to escape by way of the inclined channel into the annular channel to the main which is connected to the latter. On account of this lateral exhaustion of the gases, however, it is necessary that the air should be supplied to the generator approximately along its vertical axis, so as to pass to the centre of the charge, in order that it shall with certainty traverse not only the lateral, but also the central, portion of the charge; for if the air were supplied peripherally it would simply pass close along the walls of the generator, so that the central column of combustible material would remain untraversed by it. But, further, not only must the secondary air supply (the air supplied to the third point of entry named above) be central, but the air must also impinge on the combustible at a point somewhat beneath its surface, so as to come into contact with the flank, so to speak, of the tar vapours and thereby effect the combustion of the latter in a satisfactory manner.

This object may be attained in various ways. The simplest expedient is to provide an air-pipe (preferably cooled) extending from above downwards to a greater or lesser depth in the combustible stratum. But it has been found more practicable to employ, instead of this pipe, a ring, either open or furnished with a protective roof. The ring should be of such a width that the coal or coke lying beneath its lower margin may, in taking up its natural angle of inclination, form a wide funnel or crater underneath, into which the secondary air may freely enter.

By the time that the fuel arrives in the vicinity of the lower margin of the ring, it will have lost its gases and vapours, so that the crater already offers to the secondary air a strongly degasified combustible. This is important, because a very high temperature is produced in the crater by the introduction into it of the secondary air; and therefore also the air for the combustion of the tar vapours which it encounters is strongly heated preliminarily. By adjusting the ring to a higher or lower position, the zone of the secondary air, and thereby its action on the fuel, may be varied at will.



A gas-generator suitable for carrying out the process is illustrated in central vertical section.

The body of the apparatus is provided with a grate and an air supply-pipe C as usual, and, in the present case, with a water-supply or an evaporating dish D and with an ash-hole F. The power gas is drawn off through the pipe G, either by a special exhaust-pump or by the motor itself, from the annular channel H, which occupies a position in the generator above the conical slope K of the combustible. In the upper part of the generator the ring M is so set as to allow of its height being adjusted. It is furnished with lateral slits (above the level of the freshly introduced coal) through which the air can gain access to the interior of the ring. The fuel is supplied to the space Q around the ring—this space being left open at the top, so that the air has access to the fresh fuel from above only. This arrangement allows of the easy breaking up of the fuel when it tends to cake together.

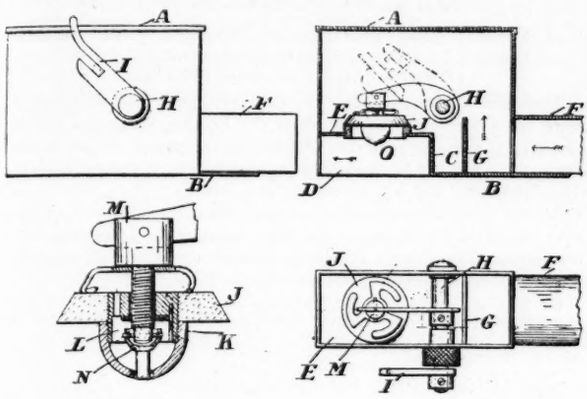
Beneath the lower edge of the ring is formed the funnel-shaped crater S into which the secondary air enters, passing through the fuel and burning the products of combustion and distillation produced in the upper part of the same to form fixed gases, which, in traversing the glowing coke, are for the most part transformed into carbon monoxide and hydrogen, together with nitrogen.

Valve Mechanism for Prepayment Gas-Meters.—Reeves, E. A., of New Haven, Conn., U.S.A. No. 27,670; Dec. 19, 1904.

It is the object of this invention, among other things, to construct a valve in which a materially diminished supply of gas will be permitted to pass through the meter after the main supply has been shut off, and, "to accomplish this end with mechanism of the fewest possible parts, so designed as to be economically constructed and readily assembled." The valve is so arranged that a full supply of gas will pass through it until substantially the whole of the supply has become exhausted, at which time the valve is closed; but, by means of an auxiliary valve connected with the other valve, a much diminished quantity of gas will continue to pass, "which supply will be of no practical value for lighting purposes, but furnishing, however, a warning to whomsoever may be using the gas, and permitting them to place another coin in the meter, and thereby secure a fresh, increased supply." The mechanism is arranged and usually adjusted so that this diminished supply will be sufficient to keep the lights burning for at least ten or more hours, or longer, if desired, "thereby furnishing a practical and successful safeguard against the disadvantages of the old type of meter."

The valve case shown (p. 777) is secured to one side of the meter; being closed at one end by the cover A, and at the other end by the floor B, which is turned upward at C parallel to the ends of the case, so as to leave a compartment D below the portion of the floor E. The gas supply enters through the pipe F; and midway between the end of this pipe and the portion of the floor C is a baffle-plate G, arranged in front

of the opening concentric with the pipe F, so as to prevent the insertion of a wire, rod, or other device to interfere with the operation of the valve mechanism. Within the case is a rock shaft H journaled at one end in a bearing and near the other end in a stuffing-box through which the shaft projects. Fixed upon the shaft, outside the case, is the lever I.



The main valve comprises a valve disc J with the plug threaded through it, upon the bottom end of which is the cup K, having a port-hole through the bottom. In the underside of the plug is a chamber L, and extending through the body of the plug, parallel with the axis, is a port-hole, and parallel with the port is a fixed pin or stud driven into the plug and projecting into the recess.

Concentric with the valve disc J, and moveable longitudinally through the plug, is a valve stem having an enlarged head M at one end—that is, slotted lengthwise, and within which is pivotally secured the end of a lever that is fixed to the rock shaft H. Upon one end of the valve stem is secured an auxiliary valve N; and projecting downwards from the valve is the plug of less diameter than the port-hole referred to above, and through which it moves freely.

In operation, the insertion of a coin within the meter causes the valve disc J to be opened so that it assumes approximately the position shown by broken lines, at which time the gas enters the case through the pipe F and follows substantially the path of the arrows, through the collar O, fixed in the floor of the case, that forms a seat for the valve disc. The lever I is connected with the coin mechanism, and is operated in one direction by the mechanism and in the other direction by the movement of the gas through the meter. When the predetermined quantity of gas has become substantially exhausted, the movements of the mechanism cause the valve J to close, so that it rests upon its seat upon the collar O. When the disc is upon its seat as described, the main supply of gas is shut off; while a much diminished supply is permitted to escape into the cup K, and thence into the compartment D, through the port-hole—this diminished supply being sufficient to keep the lights burning, but not to furnish light of any practical value. The movement of the rock shaft H still continues as when the valve J was open; but, naturally, it moves at a lessened speed, owing to the diminished quantity of gas being used. But the continued movement causes the valve stem to move downwardly until it has forced the auxiliary valve N upon its seat; thus closing the port-hole and shutting off all of the gas supply. The endwise movement of the valve stem, just described, is made against the tension of a spring, which is flattened out when the auxiliary valve is closed.

APPLICATIONS FOR LETTERS PATENT.

4612.—Redman, T., "Gas-pendants." March 6.
4673.—Anderson, D., "Mantles and burners." March 6.
4677.—Liebermann, L. S., "Incandescent lighting." March 6.
4714.—Sarginson, W. W., "Generation of acetylene." March 7.
4823.—Armour, W., "Pyrometers." March 8.
4860.—Verdier, J., and Teulon, P., "Discharging retorts." March 8.
4865.—Gilbert, E. W., "Controlling gas supply." March 8.
4887.—Dickinson, H., and Marshall, F. R., "Gas-cocks." March 8.
4911.—Fowler, C. H., and Medley, E. A., "Making gas." March 9.
4917.—Whitfield, C., "Gas producer." March 9.
4956.—Busse, P., "Producing coal gas." March 9.
4987.—Reiss, C., "Inverted lamps." March 9.
5008.—Bowman, H., and Southworth, J. T., "Gas-producers." March 10.
5012.—Leigh, A. G., "Increasing pressure." March 10.
5023.—Blair, D. R., "Gas-irons." March 10.
5028.—Bray, J. W., "Incandescent burners." March 10.
5077.—Jahns, F., "Producer gas." March 10.
5111.—Hack, H., and Hewett, J., "Valves for gasholders." March 11.

Paris and the Purification of its Water Supply.—The Paris Municipality are organizing a competition with a view to securing the best methods for the purification of water supplies to towns. All persons who desire to compete are asked to send a description of their systems, on or before May 15, to the "Préfecture de la Seine, Direction Administrative des Travaux de Paris, Bureau des Eaux, Canaux et Egouts," from whom further data as to the competition may be obtained.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Gas for Power Purposes.

Sir,—To those employed in distribution departments, who may be not infrequently exercised how to "go one better" than the producer-gas man, your article should be particularly welcome.

It is of interest to observe that in the United States in the year 1902 the sale of gas for fuel purposes was 19·55 per cent. of the total marketed product; while in 1903 it accounted for 25 per cent.—a healthy increase for one year. In 1902, the average price (for all purposes) was $1·009 per 1000 cubic feet; and in 1903, 97 cents.

Throughout the industry in the States, differential rates prevail; but the average lower price for fuel gas does not suggest that the increase of business was secured by any desperate reduction from fear of competition.

Fulham, S.W., March 17, 1905. J. Arnold.

A Reasonable Complaint.

Sir,—We have noticed, with regret, that there appears to be an increasing tendency among gas companies, corporations, and district councils to give only a few days' notice when inviting tenders for stores. This notice is probably quite adequate where the articles to be tendered for are such as coal, lime, &c.; but for gas-fittings a shorter notice than from ten to fourteen days is not sufficient.

There is a clause in almost all such tenders to the effect that fittings must be equal to the samples kept at the company's or corporation show-room. We have never yet seen a tender form on which sufficient particulars are given to enable a quotation to be made out without an inspection of such samples. In many cases, this will mean a special journey of (say) 200 miles; and we do not think it reasonable to expect manufacturers to be prepared to undertake this at a day's notice.

As an illustration, we may say that we have just recently applied for a tender form, and sent a traveller out specially to get the necessary particulars. We unfortunately omitted in the first instance to notice the date by which tenders had to be lodged; and, although not a day was lost, we were too late.

Moreover, many companies insist on a large number of samples being supplied with a tender; and where these have to be specially made, as is usually the case, we do not think it unreasonable to ask that fourteen days' notice may be given.

The primary object in putting contracts up to tender is surely to secure the best possible value. We cannot see that it would be any inconvenience to those who have such contracts to place to give longer notice; and it must be contrary to their best interests to exclude a number of tenders, as many of them undoubtedly do at present.

March 17, 1905. Gas-Fittings Manufacturer.

Automatically Lighting and Extinguishing Street-Lamps.

Sir,—The patent of Mr. J. L. Bruce, of Kogarah, New South Wales, recently published, and numbered 26,680 of 1904, includes a number of claims which are practically identical with those of my own patent of some years ago, for regulating gas-ways by means of alterations in the level of the sealing liquid due to the operations of a displacement plunger. That Mr. Bruce's invention in this connection was fully anticipated by me, will at once be apparent from the following extracts from my complete specification:—

An efficient control of the flow of gases from gas, chemical, or other works by means of the displacement or alteration of the level of a quantity of liquid. A valve constructed with a plunger or piston in combination with an aperture through which the gas flows, and a reservoir containing a suitable liquid which is displaced when the valve is closed, and rises to cover the aperture through which the gas flows or to form a seal around such aperture substantially as described.

I have for some time past been working upon an appliance for the purposes above mentioned, to be operated in accordance with this patent, the designs of which have already been inspected by several leading gas engineers. This I hope shortly to be able to submit to the profession as a whole. I certainly think that, to ensure full and permanent success, such an appliance must be free from complicated mechanical devices and workings, and more especially from delicate adjustments.

Sandwich, March 14, 1905. T. Ebenezer Pye.

Costly Street Lighting at Harrogate.—Referring to a question asked by a member of the Harrogate Town Council—whether some return could be got out showing the cost of gas as against electric light as a street illuminant—the "Yorkshire Observer" says: It is generally recognized in Harrogate that the electric arc lamp is a very costly and an altogether unreliable quantity; and the idea is gaining ground that this system of street lighting is only continued in order that the electric light returns may be kept up. At the present time, Harrogate streets, in addition to nearly 2000 gas-lamps, are lighted by about 50 arc lamps, the annual cost of the latter working out at about £23 a piece. Seeing that one arc lamp only displaces three ordinary gas-lamps—the total cost of which is not more than £8—there is some reason for the ratepayers' belief that the town's interests would be better looked after if electric street lighting gave way entirely to gas. The last few weeks have seen the electric light superseded by gas in several business places; and unless the Corporation can find better means of cheapening and popularizing the supply, there is every likelihood that gas will maintain its lead.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The Hessle Gas Bill has been referred to a Select Committee, consisting of Viscount Falkland (Chairman), the Earl of Hardwicke, Lord Sinclair, Lord Lilford, and Lord Carew; to meet next Tuesday.

HOUSE OF COMMONS.

Monday, March 13.

EXPLOSIONS IN TELEGRAPH INSPECTION CHAMBERS.

Sir THOMAS DEWAR asked the Secretary of State for the Home Department whether he would state the number of accidents reported by the police during the last three years as having occurred in the streets of the Metropolis through gas escaping into a telegraph inspection chamber and coming into contact with leakage in an electric wire; and whether such accidents were brought under the notice of the Postmaster-General with a view to the insulation of the electric wires, or such other preventive measures as might be deemed prudent.

Mr. AKERS-DOUGLAS said that during the three years ending Dec. 31, 1904, the Metropolitan police reported six explosions as having been caused in the way mentioned in the question; and a seventh case, in which a similar explosion of gas was supposed to have been caused by a lighted match. In addition to these cases, the police reported 23 similar accidents in which explosions occurred through the accumulation of gas in electric light or supply boxes. He added that it was the duty of the police to report such accidents at once to the Post Office authorities or to the electric supply companies, as the case might be.

Wednesday, March 15.

THE PROSPECT OF A FAILURE OF THE WATER SUPPLY.

Mr. REGINALD LUCAS asked the President of the Local Government Board whether his attention had been called to the alleged prospect of a general failure of the water supply of the country, and whether the matter was engaging the attention of the Government.

Mr. GRANT LAWSON said there did not appear to be any prospect of a general failure of the water supply. There was a deficiency of rainfall during 1904, and it was continued during the first two months of the present year. This had caused a shortage of water in some parts of the country where the supply was obtained from superficial sources; but the rain of the last few weeks might be expected to replenish these sources.

Thursday, March 16.

LONDON BOROUGH COUNCILS AND ELECTRIC FITTINGS.

The London County Council (General Powers) Bill having been read a second time,

Sir F. BANBURY moved that the Select Committee to whom the Bill would be referred should be instructed to omit Part XV. He said the portion of the Bill which he desired to omit empowered the London Local Authorities to supply electric wiring, fittings, and apparatus to the premises of the consumers, and to borrow money for the purpose. The object was to introduce municipal trading, and to interfere with the legitimate work carried out by private shopkeepers, contractors, and engineers.

Mr. BURNS said the County Council were acting in this matter on behalf of the Borough Councils. There were in London thirteen electricity companies who had power to supply light and to sell to the consumers the necessary fittings and appliances. Parliament had given to sixteen Borough Councils the power to supply the electric light in London; but they could not do so effectively or cheaply if the fittings and appliances had to be bought from middlemen who frequently made large profits out of the consumers. The Borough Councils, without exception, had asked the County Council to apply for powers in their Bill to enable them to sell fittings to people who took their electric light; and it was ridiculous to call this a glaring instance of municipal trading. Let members be consistent. Why should they refuse the power to the Borough Councils and at the same time allow the South Metropolitan Gas Company to supply burners and cooking-stoves?

Sir H. KIMBER said he was strongly opposed to this attempt to tax the ratepayers in order to set up business in competition with private enterprise.

Mr. BENN pointed out that the Woolwich and Marylebone Borough Councils already possessed these powers.

Major EVANS-GORDON said he was convinced that it was reasonable these powers should be given to the Borough Councils, and he should vote against the instruction.

On a division, the numbers were: For the instruction, 190; against, 195—majority against, 6.

The following further progress has been made with Bills:—

Bills read a second time and committed: Brentwood Gas Bill, London County Council (General Powers) Bill, Seaham Gas Bill.

Bills reported, with amendments: Accrington District Gas and Water Board Bill, Brompton, Chatham, Gillingham, and Rochester Water Bill, Walker and Wallsend Union Gas Bill.

The Birmingham Corporation Bill and Swansea Corporation Bill have been referred to a Select Committee, consisting of Mr. Stevenson (Chairman), Mr. Allhusen, Mr. Rose, and Mr. Moon; to meet to-day. This Committee will also have before them the Shropshire and Worcestershire Electric Power Bill, and the South Wales Electrical Power Distribution Company Bill.

The Croydon Corporation have withdrawn their petition against the Croydon Gas Bill, and the Hertfordshire County Council theirs against the Great Berkhampstead Gas Bill.

THE METROPOLITAN GROUP OF GAS BILLS.

House of Commons Committee.—Thursday, March 16.

(*Before Mr.* F. CAWLEY, *Chairman, Sir* WALTER PLUMMER, *Mr.* KENNETH BALFOUR, *and Mr.* MOONEY.)

THE LONDON (COUNTY COUNCIL) GAS BILL AND THE GASLIGHT AND COKE, SOUTH METROPOLITAN, AND COMMERCIAL GAS COMPANIES BILL.

The Committee to-day began their consideration of these Bills, which were taken together. The object of the London (County Council) Gas Bill is to amend the Acts relating to the supply of gas in the Metropolis, and to make further provisions with reference thereto. The Companies' Bill is to amend the Acts relating to the Gaslight and Coke, the South Metropolitan, and the Commercial Gas Companies with regard to the testing of gas, the procedure for forfeitures, and otherwise. The County Council petitioned against the Companies' Bill, and the Companies against the County Council Bill.

Sir RALPH LITTLER, K.C., Mr. FREEMAN, K.C., and Mr. TALBOT appeared for the London County Council. The Gas Companies were represented by Mr. BALFOUR BROWNE, K.C., Lord ROBERT CECIL, K.C., Mr. L. ROSTRON, and Mr. BERNARD WILKINSON.

THE TESTING CLAUSES.

CASE FOR THE COUNTY COUNCIL.

Sir RALPH LITTLER, in opening the case for the London County Council, gave a history of the legislation with reference to the candle power prescribed; the first point put before the Committee being the clauses in the two Bills purporting to carry out the recommendations of the Committee appointed by the Board of Trade with regard to the testing of the illuminating power of the two qualities of gas—viz., the 16-candle gas of the Gaslight and Coke Company and the 13-candle gas (called 14 candles) of the South Metropolitan and Commercial Companies. These recommendations were as follows:—

(*a*) That the standard burner to be used for testing the illuminating power of all qualities of gas should remain, as at present, the Sugg "London" (No. 1) argand burner, and that the chimney to be used therewith should be of uniform size—namely, 6 inches long and 1⅛ inches internal diameter.

(*b*) That for the purpose of determining the nominal illuminating power of gas of any quality, the gas should be burnt in the standard burner at the rate of 5 cubic feet an hour.

(*c*) That provision should be made for official testing of illuminating power in a flat-flame burner, of a kind to be prescribed by the Gas Referees, and that the result of such tests be recorded and notified to the various Authorities and Companies concerned and to the Board of Trade.

(*d*) That official tests of the calorific power of the gas supplied by each Company should also be made, recorded, and notified as above.

What the County Council wanted was a method by which the gas consumer should be able to ascertain for himself (or somebody should ascertain for him) what he was really getting, and that he might understand the method by which the Referees themselves arrived at it. They proposed to carry out the recommendations of the Committee in clauses 3, 4, and 5 of their Bill:—

(3) The burner for testing the illuminating power of the gas supplied by the Company shall be Sugg's "London" argand, as prescribed by section 37 of the Gaslight and Coke Company Act, 1876, section 38 of the South Metropolitan Gaslight and Coke Company Act, 1876, and section 34 of the Commercial Gas Act, 1875; and in testing the illuminating power of the gas, shall be used with a chimney 6 inches long by 1⅛ inches internal diameter.

(4) (1) The gas supplied by the South Metropolitan Gas Company and the Commercial Gas Company respectively shall, with respect to its illuminating power, be such as to produce, when consumed at the rate of 5 cubic feet an hour in the burner hereinbefore described, a light equal in intensity to the light produced by 13 sperm candles of six to the pound, each consuming 120 grains an hour. (2) Section 5 of the South Metropolitan Gas Act, 1900, and section 12 of the Commercial Gas Act, 1902, shall be read and construed as if the illuminating power of 14 candles referred to in those sections respectively had been the illuminating power prescribed by this Act.

The only part of section 5 of the Bill which related to this point was sub-section 3 of sub-clause I:—

Each gas examiner shall at such times and places and in such manner as may be from time to time prescribed by the Gas Referees, make testings of the gas supplied by the Company for the purpose of ascertaining the illuminating power as ascertained by means of a flat-flame burner to be prescribed by the Gas Referees.

Counsel said he wished the Committee to contrast the simplicity of the Council's clause 4 with the proposal in clause 6 of the Companies Bill:—

(i.) The gas supplied by the Company shall be tested in respect of its illuminating power with the burner known as Sugg's "London" argand No. 1 burner (in this Act referred to as "the prescribed burner"), which shall correspond to that which has been deposited with the Warden of the Standards in accordance with (among others) section 37 of the Gaslight and Coke Company Act, 1876. The glass chimney used with the prescribed burner shall be 6 inches in length by 1⅛ inches in internal diameter.

(ii.) The standard of comparison shall be Harcourt's standard ten-candle pentane lamp, as in use at the passing of this Act (in this Act referred to as "the standard lamp.")

(iii.) The pentane used shall be as prescribed in Part I. of the Schedule A to this Act.

(iv.) The photometer used for testing the illuminating power of the gas supplied by the Company shall be the table photometer in use at the passing of this Act, but modified by having the prescribed burner carried on a traversing slide.

(v.) Each testing shall be made with the gas-flame of such length that the irregularities of its upper edge appear to be equally divided by an imaginary horizontal plane 3½ inches above the upper surface of the steatite ring of the prescribed burner. The adjustment of the height of the flame shall be made by observing its reflected tip in a mirror provided for that purpose. The prescribed burner shall be moved to or from the photoped until equality of illumination is obtained, when the illuminating power indicated by the

scale shall be noted. This operation shall be performed four times at intervals of not less than one minute; and the average of the four readings shall be ascertained. The hourly rate of gas consumption during the time of determining the illuminating power of the gas-flame shall be carefully ascertained; and from this and the average of the observations made of the illuminating value of the gas-flame the illuminating power of the gas under test shall be calculated by simple proportion for any variation of its actual rate of consumption from 5 cubic feet per hour. Proper correction shall be made for variation from standard atmospheric conditions of 30 inches height of barometric pressure and 60° Farenheit temperature.

Mr. BALFOUR BROWNE remarked that, though it seemed complicated, it was simply the existing test.

Sir R. LITTLER said that, with regard to illuminating power, the Companies' Bill proposed:

(7) The gas supplied by the Gaslight and Coke Company shall be deemed to be of the illuminating power of 16 candles if, when tested in the manner prescribed by this Act, its illuminating power is equal to 1·6 times the illuminating power exhibited by the standard lamp when the actual consumption of the gas consumed in the prescribed burner shall have been calculated back to the rate of 5 cubic feet per hour.

DR. FRANK CLOWES, EXAMINED BY MR. FREEMAN.

Witness (who is Chief Chemist and Superintending Gas Examiner to the County Council) said that at the present time two grades of gas were supplied to consumers in London—16-candle by the Gaslight and Coke Company and 13-candle (called 14-candle) by the Commercial and South Metropolitan Companies. There were two different methods of ascertaining the illuminating power of gas. The first (adopted by the Gaslight and Coke Company) measured the lighting power of the gas when burnt in a standard burner at the rate of 5 cubic feet per hour; the second (which was applied to the South Metropolitan and Commercial Companies) burnt the gas at such a rate as to give a 16-candle flame with the standard burner, and then corrected if necessary for the rate of consumption. The Departmental Committee appointed by the Board of Trade discussed the proper test for gas in the Metropolis; and the result was that they made the recommendations read by Sir Ralph Littler—applying to all the Companies the system now adopted by the Gaslight and Coke Company. Clauses 3 and 4 of the Bill promoted by the County Council carried out the suggestion; whereas the system proposed by the opposing Companies was not that approved by the Departmental Committee. The method of testing should be a uniform one—that was, there should be a definite meaning attached to gas of a certain candle power. It would be very unwise to depart from the statutory method. All they wanted was to be able to define the value of the gas.

Mr. FREEMAN: If you adhere to the old statutory method which is recommended by the Departmental Committee, will you be calling the gas by its real value?

Witness: Unfortunately, the real value will vary according to the burner used; and the only plan therefore is to define one burner and give the value of the gas by means of that one burner.

That is exactly what has been done by the Bill of the County Council, and what is recommended by the Departmental Committee?—Yes. The Committee went carefully into the question; and it is very desirable in the public interest that this opinion should be embodied in legislation.

CROSS-EXAMINATION BY MR. BALFOUR BROWNE.

Mr. BALFOUR BROWNE: The object of gas testing is to ascertain the article that is supplied to the public?

Witness: To define the article supplied to the public.

Surely it is to ascertain whether it is being supplied?—Yes.

Will you agree with the principle that you ought to test it in such a way as does full justice to the gas?—I think that is impossible.

You can do it in a way that does injustice to the gas?—I think not. You want some uniform method by which you can compare the value of different gases.

Can you not, with Sugg's argand burner, burn it in such a way as not to give it its full value in the test?—No, I think not, if you adopt the statutory method.

You have to have a chimney of a certain size and height. Does not the flame in that chimney or that burner depend on the amount of air that is supplied?—It will vary with the amount of air.

May you give to the flame too much oxygen?—Undoubtedly.

May you give too little?—Yes.

And will not the quantity of oxygen that will properly burn with the gas depend upon the quality of the gas?—Yes.

What you want is a uniform mode of testing. Is this test uniform for a 14 and a 16 candle gas?—Yes.

But it is not a fair test in the two cases?—The Departmental Committee say they do not attempt to give the full value. They simply require a nominal or defined value of a gas.

Are there not three false assumptions in the Committee's report. First, that the South Metropolitan gas will be of a regular value of 13 candles; if it is not of a regular quality of 13 candles, the test will not be a right one?—The gas will not be right.

Do you not know it is not 13 candles in the requirement; it is 13, *plus* a margin? Do you not know that that gas, tested in the way you are advocating, gives very different results indeed?—Not with the same gas.

We will be able to show it does?—There is a small margin—perhaps 0·1 or 0·2. That is recognized, but nothing more than that.

Do you say that a Sugg's argand burner, such as is described here, with 5 feet an hour, is an equally good scientific test for a low-quality gas as for a 16-candle gas?—It is as good a scientific test in the way of fixing a standard; and that is all we ask for.

If I want to find the real value of the gas, must I not either vary the burner or vary the amount of gas which is burnt in a certain time?—It is quite possible there would be some difference in that; but the Committee considered there is so great an advantage in the uniform method of testing that they waived all questions of that sort, and give the nominal definition of each gas.

A uniform method applied to different qualities of gas does not produce uniform results?—It gives a uniform result with the same gas; and that is all we require.

Is not this test which you were speaking about a fairly good one of a 16-candle gas—5 feet an hour?—I assume it is.

Will you say it is a good test for a 12, 13, or 14 candle gas? Is it one you, as a scientist, would adopt?—I have no reason to adopt a special test for the 12 or 14 candle gas. The Committee say the advantage is with a uniform system.

Whether it does justice to the gas or not?—Certainly.

Leaving out the Departmental Committee altogether, is not the test proposed in our Bill, clauses 6 and 7, a good scientific test to ascertain the value of low and high quality gases?—I have made experiments on this process of using a flame 3½ inches high; and while when we make our experiments with a uniform rate of 5 feet we get absolutely uniform results with different operations, with this method the results differ, so that the test is not a good one, because it is not uniform.

Have you the results of those tests?—Not here; but I can hand them in.

Have you made tests with flames properly filling the chimney?—There is not a definition here of properly filling the chimney; it says a height of 3½ inches.

In order to burn gas properly, you ought to have the flame filling the chimney?—I am not prepared to say that.

You must have a defined height, and would not that height alter under the conditions of supply of so many feet per hour?—Yes; but I do not agree that for the 14-candle gas you are to get the best possible value. We simply want a definition of the gas.

The method proposed does not do the same for the 14 as for the 16 candle gas?—I will not say that. I will say there is another method by which you get better results.

What is that?—The method you suggest.

In testing the value of a gas either in an incandescent burner or a flat-flame burner, would not your method be to test the value at various rates of burning until you obtained the maximum result?—If I were trying to find the value of the gas, I should do as you say.

Is not that the way the ordinary consumer proceeds? He alters the 5 feet an hour either up or down?—The only way is to burn the gas at a uniform rate.

The Departmental Committee say: "The issue would be of greater importance to the Companies if it were proposed to alter the actual quality of the gas they are required to supply." That is not proposed?—No.

The Gaslight and Coke Company are still to supply 16-candle gas, and the South Metropolitan Company 14-candle gas?—Thirteen-candle gas; but it is called 14-candle gas.

"The question is whether it is better to call gas 13-candle gas because when burnt in the same burner and at the same rate as that adopted for the 16-candle gas it gives a lower figure, or to call it 14-candle gas because it gives 14 candles per 5 cubic feet when burnt at a proportionately greater rate." Does not the truth of that proposition depend upon the fact that we get from the 14-candle gas 13 candles, and uniformly get it by that test?—We test it by our uniform method, and get 13 candles.

If it is sometimes much below and sometimes much above, then that proposition would not be true, because it would not be one of nomenclature? It is the same gas by this test; but it seems to vary. If it is not given by this method as 13-candle gas, we are being treated unfairly?—I do not think so.

Now go on to the next proposition: "It appears to the Committee that, in selecting the method, the object is not so much to ascertain the relative value of the different qualities of gas as to define the quality of the gas without ambiguity." Does this mean the quality of the gas to be supplied?—It means to define the constancy of the quality of the gas supplied. The Committee said their only object was to be able to define the gas with the object of testing it from time to time.

You agree that this does not give its true value?—"True value" has no meaning, really.

Let me take two cases—a 16-candle gas entirely made from coal and a 16-candle carburetted water gas. Would the 5 feet an hour test show that these gases were the same or different?—I do not mind whether it does or not.

But it does matter to the seller and the purchaser?—No.

Would the proportionate difference between a 16-candle and a 14-candle gas increase by this method of testing as between 16 and 13·5?—If they are tested by the uniform method recommended by the Departmental Committee, the difference between 16 and what we call 14 candle gas would be greater than if we had the two different methods adopted by the two different Companies.

Supposing our gas goes down to 13·5 candles, will not this method of testing exaggerate the defect?—Very slightly.

In re-examination by Mr. FREEMAN, witness stated that the Departmental Committee had had a very large amount of evidence put before them on the question of the testing of the illuminating power.

CLOSE OF THE COUNCIL'S CASE.

Sir RALPH LITTLER said other witnesses would only present the same view; and therefore that was the case for the London County Council on this part of the Bill. The Corporation of the City of London were entirely supporting the Bill.

Mr. BALFOUR BROWNE said he would call his evidence before making any observations.

SIR GEORGE LIVESEY, EXAMINED BY LORD ROBERT CECIL.

Witness said that in 1848 there were no parliamentary regulations or restrictions as to the illuminating power; the Gas-Works Clauses Act of 1847 having no provision as to this. At that time there were thirteen Companies; and Parliament relied upon the competition between them. There were at least two, sometimes three, and even four Companies with mains in the same street. There were no tests for illuminating power till 1850. By burning 14-candle gas at 5 cubic feet an hour in the first place very uncertain results were obtained. One did not get the very best results; and it was not the way the consumer would burn it. He burnt it in order to give the best light. The way to do this was to turn the gas on and off until one obtained a proper light, and then to see how fast one was burning the gas. This was

what the Referees themselves did with a view of testing the 16-candle gas. They abolished the 5 feet rate, and said it must always be burnt at such a rate as to give 16-candle power.

Lord ROBERT CECIL: If you burn the 14-candle gas at the rate of 5 feet per hour, as is suggested, what result will this have on the apparent power of the gas?

Witness: When we were before the Departmental Committee, it was said the result would be that it would appear as a 13-candle gas. This was not disputed by anyone, though it is true that a hint had been made that the variation of 1 candle was not constant. But we now find that burning the gas at 5 feet per hour will sometimes show 13-candle power, and sometimes 12½ candles. There is no certainty in it; there is not a constant difference of 1 candle.

Under your Act, you incur no penalty if you supply the gas at 13½ candles?—That is so. This was done in the 1875 or 1876 Act. But we always supply considerably above. All the tests made by the County Council show that the Companies always supply over their standard, except accidentally.

Will the effect of its being a little under be very much exaggerated by the method advocated by the County Council?—Yes. There is a great deal more difference as you go down.

Lord ROBERT CECIL: We submit that point was not before the Committee.

Sir R. LITTLER maintained that it was.

Witness said they never dreamed that the Departmental Committee would suggest that method of testing. They accepted the statement of the County Council that it would appear as 13-candle gas; but they had since made a number of experiments with different qualities of gas, and found that at 16½ candles the two systems coincided. As, however, they went down below this, the difference increased in almost geometrical progression. When they got down to 12-candle gas, it showed a little less than 8 candles by the method advocated by the County Council. He believed the Departmental Committee were under the impression that there was a constant difference of 1-candle power—that 14-candle gas would show 13 candles, 13-candle gas would show 12 candles, and so on.

Lord ROBERT CECIL said their whole point before the present Committee was that experiments had satisfied them that it was not solely a question of nomenclature, which the Departmental Committee said it was. This was an error. No evidence to the contrary was put before the Departmental Committee; and it was not surprising that they fell into the error. What was discussed was whether it was fair to test what they called 16-candle gas in such a way as to give it an apparent value of 13 candles; and the whole discussion proceeded upon the basis that the test recommended by the County Council would produce this effect, and no other. Now they were prepared to show the present Committee that, in addition to the objection they still felt to this method of testing, in point of fact if the gas fell ever so little below 14-candle power, the test exaggerated the fall so that they would be in the position of not having the same facility of supplying gas as they had at the present time.

Witness said that a 12·2-candle gas showed 7·73 candles tested in this way.

Lord ROBERT CECIL: You lose ½ candle in 15-candle gas, 1 candle in 14-candle gas, and 1½ candles in 13-candle gas.

Witness: Yes; and 2 candles in 13½-candle gas, and 3 candles in 13-candle gas.

The CHAIRMAN: You ask us to upset the suggestion of the Board of Trade Committee, though the Committee were appointed to fix the matter up?

Lord ROBERT CECIL: I do not think the Board of Trade suggested that the Committee were going to oust the jurisdiction of Parliament.

Mr. FREEMAN said it was agreed that experts should be appointed to go into the question; and the Committee were therefore appointed with the consent of all the parties. The Gas Companies were now asking the present Committee to reverse the decision.

Sir WALTER PLUMMER: If you could have anticipated the result of the Departmental Committee, you would have carried out experiments before you gave evidence?

Witness: Certainly. We had no idea of such a thing.

Lord ROBERT CECIL said it was pointed out to him that one of the Gas Referees had said this before the Departmental Committee: "There is a difference of 1 candle when the gas is 14-candle power under the new system or 13-candle power under the old; and a difference of 1½ candles when the gas is 13½-candle power under the new system or 12-candle power under the old." But their point was that he did not put it nearly strong enough, though it was true it was mentioned that there was this increased difference in the effect as the gas came down. This was not taken up in any way in his examination.

An Arrangement Suggested.

The CHAIRMAN asked if the Companies had any other suggestion to make which would not be asking the present Committee to pass an entirely different system to that recommended by the Departmental Committee, and a highly scientific and technical one.

Witness said they were quite prepared to stick to the present method as passed in the South Metropolitan Gas Company's Act of 1900, section 6: "The burner for testing gas supplied by the Company shall be Sugg's 'London' argand as prescribed by section 38 of the South Metropolitan Gaslight and Coke Company's Act, 1876, and in making such testings shall be so used that the gas shall be burnt at such a rate as shall give a light equal to 16 candles." He was prepared to say, on behalf of the three Companies, that they would agree to stand by this.

The CHAIRMAN said the Committee were only throwing out the suggestion that an arrangement might be come to.

Lord ROBERT CECIL said he would be very glad to fall in with any suggestion of that kind, if the County Council would meet him.

Sir RALPH LITTLER said they left it to the Referees, who were the only proper people. All they wanted was uniformity.

The CHAIRMAN: My point is that, if this witness's theory is correct, the Companies might be under some little disadvantage. The point is whether you are going to stick exactly by what you have in the Bill, or whether it would be possible in any way to modify that without going into this alternative proposal.

Sir RALPH LITTLER: I think the experience of everybody is that the Referees are not unreasonable or unjust people.

Lord ROBERT CECIL: That is not relevant, because if you tell them exactly what they are to do, they must do it.

Witness: The main thing we are trying to do is to reduce the price of gas; and the County Council are doing all they can to prevent us. We are now subject to the most severe competition, both in heating and lighting; and unless we supply the consumers satisfactorily, and at the lowest possible price, we lose business. That is the great safeguard of the public, and not this stupid testing.

Mr. H. E. Jones Corroborates.

Mr. H. E. Jones was then called, and gave evidence supporting that given by Sir George Livesey. He said the point as to the apparent loss in illuminating power by the method proposed by the Departmental Committee had been left without sufficient evidence having been given on the part of the Companies.

The Views of the Committee.

Mr. BALFOUR BROWNE said the Companies were quite willing to go on testing as they did at present. Nobody really complained of that. He was sure it was not the intention of the Committee that they should destroy the article before they sold it to the public, and they ought to have a fair method of testing. They only desired to have the gas tested in accordance with the Act of 1868, which said it should be tested by the burner which would give it the fairest chance.

The CHAIRMAN: I rather wish to shorten the proceedings if possible by informing you that to bring a lot of extra evidence to show that your way is the best way of testing would, I think, be rather a waste of time.

Mr. BALFOUR BROWNE: It would puzzle anybody who was not an expert; but may I say that if I can by expert evidence show you first that what the County Council are proposing is not fair to us, and if I can also show you that experts will agree on both sides that if the method proposed by the Departmental Committee is not the right one ours is, I should ask a decision from you that my gas shall be tested in that way? I am convinced that the experts on both sides could agree a clause, if you once make it clear that my gas is not to be destroyed by their tests. I understand that my learned friend Sir Ralph Littler refused to have anything to do with it, and insisted upon what we think is an injustice.

The CHAIRMAN: I do not think you will get the Committee, by any amount of abstract evidence to prove this new way is the best way, to substitute the new clause for the one in the Bill.

Mr. BALFOUR BROWNE: I am quite content with the mode of testing introduced into the South Metropolitan Company's Act of 1900, and into the Commercial Company's Act two years ago.

The CHAIRMAN: If the promoters could get their experts to agree to some slight modification of the Departmental Committee's recommendation, it might be an advantage.

Mr. BALFOUR BROWNE: I think if somebody from our side met Dr. Clowes on the other side, the two could arrange some test which would be satisfactory to both parties.

Mr. FREEMAN: What my friend is now asking you to do is to depart from the recommendation which was the very matter that for twenty-one days was debated before the Departmental Committee.

Mr. BALFOUR BROWNE: I am quite willing to try to meet my learned friend.

The CHAIRMAN: If a settlement can be made, I think it would be advisable. Of course, I only suggest it.

Friday, March 17.

A Letter to the County Council.

Lord ROBERT CECIL stated that since the adjournment his clients had written to the London County Council as follows:—

> Referring to the observations which fell from the Chairman of the Committee to-day, we shall be glad to hear whether you are prepared to agree to any modification of the method of testing illuminating power in the Bill promoted by the County Council. We are instructed to say we shall be happy to meet you with a view to discussing it.

He was sorry to say the County Council had replied that they were not prepared to discuss the matter in any way with the Gas Companies.

Mr. W. J. Dibdin, Examined by Lord Robert Cecil.

Witness stated that in 1876 he was appointed one of the Gas Examiners for the Metropolitan Board of Works, and held this post until 1882, when he was made Chief of the Chemical Department of the Board and Superintending Gas Examiner, which position he continued to hold under the London County Council until 1897. He had made a number of investigations for the purpose of ascertaining the best means of testing the quality of the gas.

Lord ROBERT CECIL: In connection with this particular Bill, have you carried out a very large number of tests of the illuminating power of gas.

Witness: Yes. When the question arose as to the proper method of testing gases of low grade, I was requested last November by the South Metropolitan Gas Company to make a series of investigations with a view, if possible, to elucidate the truth with regard to the conflicting statements which were made. By means of special experimental plant, I took, from various samples of coal which were actually in use in different gas-works, a number of samples of gas. The gases were normal coal gases; and I tested them by various methods. For the present purpose, I propose to mention only two of those methods. One was the existing legal method, as notified by the Gas Referees; and the second was the 5-feet rate. I have tabulated these results. There are 69 different gases; and these are normal coal gases obtained in the way in which coal gases would be obtained on the gas-works.

The first column of the table shows the existing method, and the

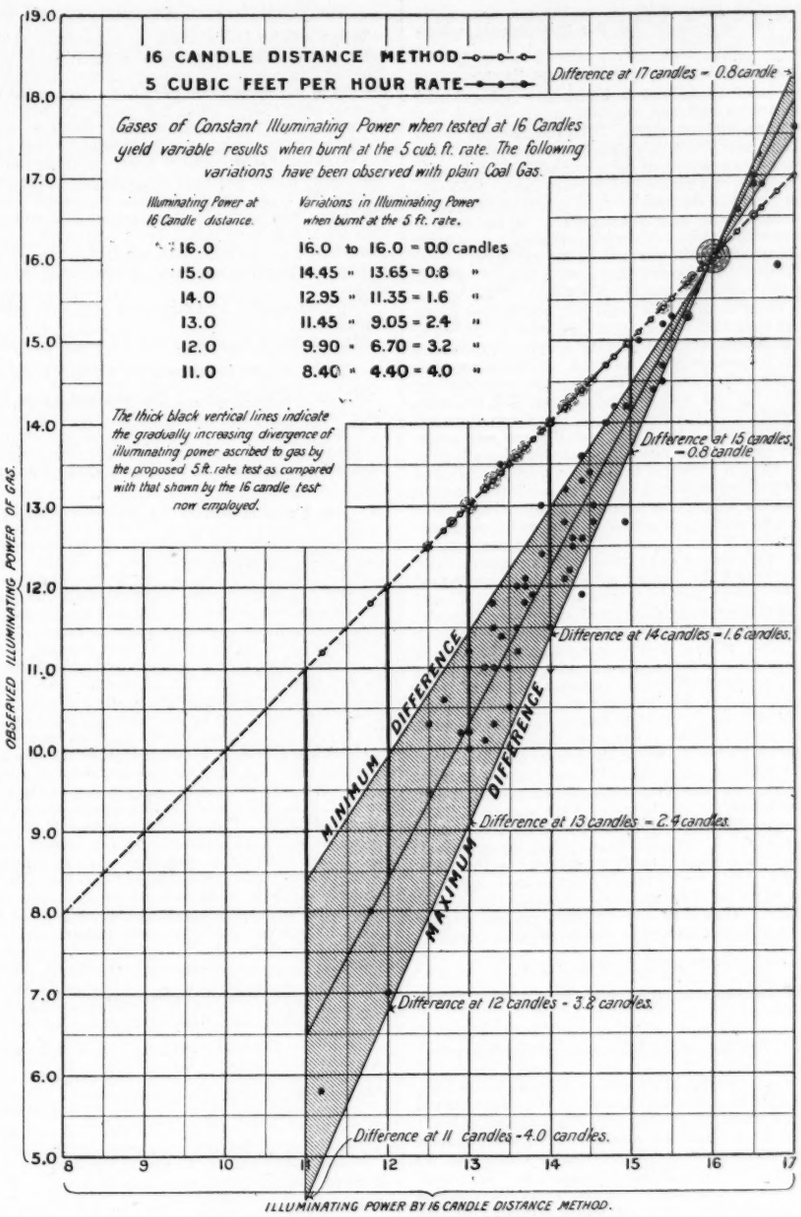

16 CANDLE DISTANCE METHOD
5 CUBIC FEET PER HOUR RATE
Difference at 17 candles = 0.8 candle
Gases of Constant Illuminating Power when tested at 16 Candles yield variable results when burnt at the 5 cub. ft. rate. The following variations have been observed with plain Coal Gas.
Illuminating Power at 16 Candle distance.
Variations in Illuminating Power when burnt at the 5 ft. rate.
16.0 16.0 to 16.0 = 0.0 candles
15.0 14.45 " 13.65 = 0.8 "
14.0 12.95 " 11.35 = 1.6 "
13.0 11.45 " 9.05 = 2.4 "
12.0 9.90 " 6.70 = 3.2 "
11.0 8.40 " 4.40 = 4.0 "
The thick black vertical lines indicate the gradually increasing divergence of illuminating power ascribed to gas by the proposed 5 ft. rate test as compared with that shown by the 16 candle test now employed.
Difference at 15 candles = 0.8 candle
Difference at 14 candles = 1.6 candles.
MINIMUM DIFFERENCE
MAXIMUM DIFFERENCE
Difference at 13 candles = 2.4 candles.
Difference at 12 candles = 3.2 candles.
Difference at 11 candles = 4.0 candles.
OBSERVED ILLUMINATING POWER OF GAS.
ILLUMINATING POWER BY 16 CANDLE DISTANCE METHOD.
19.0
18.0
17.0
16.0
15.0
14.0
13.0
12.0
11.0
10.0
9.0
8.0
7.0
6.0
5.0
8
9
10
11
12
13
14
15
16
17

DIAGRAM SHOWING THE ILLUMINATING POWER OF COAL GASES MADE BY MR. W. J. DIBDIN, AND TESTED BY THE 16-CANDLE DISTANCE METHOD AND THE 5 CUBIC FEET PER HOUR RATE.

second the proposed new method—the 5 feet an hour rate. The first gas tested showed 11·2 candles by the first method, and 5·8 candles by the second?—Yes, that is a difference of 5·4 candles.

There are a large number of tests; and I see that the 11·2-candle gas shows a difference of 5½ candles?—Yes.

Witness explained that one of the principal points was that the difference was variable. There were three gases, each of which was equal to 13·7 candles; but taking them by the 5-feet rate, the first gave a result equal to 11·8 candles, the next 12 candles, and the last 12·5 candles. There were two gases of 13·9 candles; and one gave by the 5-feet rate 12·4 candles and the other 13 candles. There were three gases of 14·2 candles according to the standard method; and one gave 12·1 candles, the next 12·8 candles, and the last 13·2 candles. This summed up the essential point. Then the same thing happened again with the gas in the next series—14·4-candle power as the standard method. One gas gave, by the 5-feet rate, 11·9 candles, the next 12·6 candles, the next 13·3 candles, and the last 13·6 candles. So that by the present legal method they gave uniform results as suggested by the Board of Trade Committee; but when tested by the 5-feet rate, they varied from 11·9 to 13·6 candles. This appeared to be a result which was not in accordance with the Board of Trade recommendation. His conclusions with regard to the 5-feet rate were, first, that it was much more unfavourable to the low-power gases than the present method; and, secondly, that it was very uncertain in its results. He had summed up the results given in the table in a diagram.

CROSS-EXAMINATION BY SIR RALPH LITTLER.

In answer to Sir RALPH LITTLER, witness said that up to November last he, in common with every photometrist, had the impression that, though there was a difference between the two tests, some tests of his had shown that the difference of 1 candle with a 14-candle gas was a fair difference to take.

Sir RALPH LITTLER: With all your long experience, up to last November would you have said quite a different thing to what you have said to-day?

Witness: I should have said, in the absence of this special information I have obtained, that the 1 candle difference was a fair thing.

Until this morning, has anybody in public had the advantage of knowing these views of yours?—No. I was asked to undertake the investigation; and I did so.

Sir RALPH LITTLER: It is a new surprise to the gas world?

Mr. BALFOUR BROWNE: Oh, no.

Sir RALPH LITTLER: Lord Rayleigh is a high authority?

Witness: He is a high authority. I should not say he was the highest.

Mr. William King was specially selected by the Gas Companies to represent them. There are few higher authorities than Mr. King?—I should not admit that for a moment.

Sir RALPH LITTLER: At any rate, he represented the Gas Companies' interests.

Mr. BALFOUR BROWNE: He did not, indeed.

Mr. KENNETH BALFOUR: You have read the report of the Departmental Committee?

Witness: Yes.

You have seen Mr. Vernon Harcourt's Appendix No. 2; and you will have noticed that he has also carried out some of these experiments, taking gas at the 5-feet rate?—Yes.

He does not show these large differences which are shown on your table?—I do not know whether these are all the same gases. I find in one case he gets 13·1-candle power at the 5-feet rate and 14·4-candle power by the other—a difference of 1·3 candles.

Mr. BALFOUR BROWNE: I daresay you will note that these experiments of Mr. Harcourt were made with a chimney 7 inches by 1⅜ inches. This is not the prescribed chimney now. Therefore this chimney

which we are quarrelling with gives more air to the gas than that. Thus these tests would not be reliable for the experiments which Mr. Dibdin has made.

SIR WILLIAM RAMSAY, EXAMINED BY MR. BALFOUR BROWNE.

Witness (who is Professor of Chemistry at University College) said that for more than 25 years he had had occasionally to do with the testing of gas on the question of illumination. His predecessor in the chair at University College was Dr. Williamson, who was Chief Gas Examiner. The legalized standard burner for comparison was Sugg's "London" argand No. 1. The old method of testing was to feed this burner with the gas to be tested at the rate of 5 cubic feet an hour, and adjust the disc between the argand and the standard burner until it was equally illuminated on either side. A simple calculation thus gave the luminosity of the gas to be tested in the term of the standard, which was made equal to 16 candles. This was found unsatisfactory; and it was changed by altering the supply of gas to the burner. This was a scientific way of meeting the difficulty. It provided, not for the exact equivalent of the oxygen supplied to the gas, but nearly the right amount; and this was the whole secret of getting proper combustion. If one got too much air, it became over-oxydized; if there was too little, it smoked, which meant that some of the products were getting away without being burnt. In the South Metropolitan Bill, and also in the Commercial Company's Bill, a temporary clause was inserted altering the old method of testing. He knew how the test was made under those Acts. In his view, it was not a perfect way of testing to arrive at the true value of the gas supplied to the consumer; but it was fairly good. A perfect way of testing would be to have a different burner for different gases; but as the burner was absolutely prescribed as the "London" argand No. 1—for testing purposes it would be almost impossible to have burners for every different quality of gas—the best way to find out the true illuminating power was by raising the pressure of the gas so as to make it pass through the burner until the light was equal to some standard. A convenient standard was 16 candles. If only 5 feet an hour was allowed, the standard claimed could never be obtained; and therefore allowing 5 feet per hour was an unsatisfactory test for low qualities of gases, because they were not completely burnt. It was a fairly satisfactory test for 16-candle gas with a burner made for that gas. If one got a proper burner for 14-candle gas, one could then test at 5 feet an hour; but if the burner was fixed, the amount supplied per hour must be altered in order to secure uniformity. He entirely agreed with the report of the Committee that it was an important thing to get uniformity; but by fixing the burner and fixing the 5 feet an hour, uniformity was not secured. This was the whole case. He had plotted a few experiments which corroborated those which had been presented to the Committee by Mr. Dibdin. One was exactly the same as one of his extremes in the way of difference on a very low-quality gas; and another was not very far from one of his extremes. Taking two 14-candle gases, one made entirely from coal and the other partly from water gas, the 5 feet an hour with the standard burner would not be a satisfactory test between the two, although the illuminating power was the same. Therefore, for different qualities of gas, one would require either a different burner or a different hourly rate.

CROSS-EXAMINATION BY SIR RALPH LITTLER.

Sir RALPH LITTLER: I daresay you have seen the evidence before the Departmental Committee?

Witness: Yes.

You observed that Mr. Trewby said this?—No; he did not point out the differences.

What is the practical injury which, in your view, is going to be done to the Gas Companies by the introduction of the County Council method?—Their gas is returned as of too low illuminating power; and, moreover, on some days it would be returned as of a very much lower illuminating power than on other days, though there was no grounds for such a return. Perhaps I might suggest, as I suggested to you outside, that as both of these tests give the same illuminating power at 16 candles a compromise could be easily arranged in this way. The proportion is: As 14 is 16, so is 5 to 5·7. I would suggest a compromise might be arranged for the clause in the London Gas Bill (clause 4) to read:—

The gas supplied by the South Metropolitan Gas Company and the Commercial Gas Company respectively shall, with respect to its illuminating power, be such as to produce, when consumed at the rate of 5·7 cubic feet an hour in the burner [instead of 5, as in the clause] hereinbefore described, a light equal in intensity to the light produced by 16 [instead of 13] sperm candles of six to the pound, each consuming 120 grains an hour.

There would require to be a second section:—

The gas supplied by the Gaslight and Coke Company shall, with respect to its illuminating power, be such as to produce, when consumed at the rate of 5 cubic feet an hour in the burner hereinbefore described, a light equal in intensity to the light produced by 16 sperm candles, &c.

I think this will be accepted by the Gas Companies as a fair method of testing their gas; and I think it will also meet the requirements of the London County Council that the method of testing should be uniform as regards all qualities of gases.

That would not be uniformity. It would be one method for one Company and another for another?—The test would be much more uniform than the present test, which does not give uniform combustion.

But it would not give the uniformity which the Gas Referees desire?—It would give uniformity.

The Gaslight and Coke Company's gas very often gives more than 16 candles; and it would be unfair to them?—They would be contented to take it.

RE-EXAMINATION BY MR. BALFOUR BROWNE.

Mr. BALFOUR BROWNE: It is a uniform method of testing?

Witness: Yes.

It only prescribes that in the one case (the 16-candle gas), there shall be, as the Departmental Committee said, 5 feet an hour?—Yes.

Because it does justice to the gas?—Yes.

On the other hand, for the 14-candle gas it says 5·7 feet, because it does justice to the gas?—Because it nearly does justice to the gas.

SIR JAMES DEWAR, EXAMINED BY MR. BALFOUR BROWNE.

Witness (who is Professor of Chemistry at the University of Cambridge) stated that he agreed with Sir William Ramsay and Mr. Dibdin that the right method of testing gases of different qualities was to supply the gas at a different rate per hour. He was convinced, from the experiments which Mr. Dibdin had made, and his accuracy as a worker and his well-known photometric ability, that his results were quite reliable. No doubt, if one could alter the burner for every gas of different quality, one might test at the rate of 5 feet an hour; but if the burner was fixed, the supply of gas per hour must clearly be altered in order to give fairness to the gas. He thought the suggested compromise was a reasonable one. Alternatively, there might be a record by both methods; so that for a year they would have one curve which would represent the results by one method, and another curve which would represent the results by the other method. They would be very different from each other.

The CHAIRMAN: You could not very well embody that in an Act of Parliament.

Mr. BALFOUR BROWNE: No; it would be difficult.

CROSS-EXAMINATION BY SIR RALPH LITTLER.

Sir RALPH LITTLER: I daresay you know Mr. Vernon Harcourt's view?

Witness: Yes.

Has there been any new scientific discovery since Lord Rayleigh's Committee sat last year?—There have been many; but not on this point.

MR. OTTO HEHNER, EXAMINED BY MR. BALFOUR BROWNE.

Witness said he had been one of the Gas Examiners for many years under the Metropolitan Board of Works and the London County Council. His view of the proper way to test gas of different qualities was this: The gas should be burnt under conditions which gave it the best chance of bringing out its qualities, and not in such a way that its illuminating power, which was an accidental thing, was suppressed. It should be burnt so that the air and the gas were duly adjusted. The 16-candle power burner was devised to burn at the 5-feet rate because the gas and air were then adjusted. This burner could be used for gases not of 16-candle power, if the gas and air were adjusted. The adjustment was made by increasing the amount of gas as the illuminating power fell. Every burner gave its best results with the gas burnt at as high a rate as it would permit—that was to say, a burner with a chimney gave the best result when the chimney was full—and if with any burner a lower quality gas was burnt than that for which it was devised, it gave the best result when it was burnt at as high a rate as was practicable. The rate for a 14-candle gas with the burner for the 16-candle gas would be much nearer 6 cubic feet than 5 cubic feet an hour; and unless this quantity was consumed, they were not really showing what was the quality of the gas which was supplied to the public. He had made many tests with the same gas under various conditions, with quite small flames, only an inch or two high, and with as large flames as the burner was capable of giving; and he could only say—it was quite obvious—that as the gas supply diminished, the illuminating power diminished out of proportion. The Departmental Committee thought that if the name of the gas was altered from 14 to 13 candles, this would be sufficient to make up for the difference; but it was not. The difference was not constant.

CROSS-EXAMINATION AND RE-EXAMINATION.

In cross-examination by Sir RALPH LITTLER, witness said that he was examined before the Departmental Committee on the seventh day, after this point had been discussed by five witnesses; but he had given no evidence on it. He had handed in a statement of his own of what he desired to say for the information of the Committee on some points.

Re-examined by Mr. BALFOUR BROWNE: He had been consulted on the question of sulphur compounds only.

DR. SAMUEL RIDEAL, EXAMINED BY MR. BALFOUR BROWNE.

Witness said that the proper way to test gases of different qualities was either to have a fixed rate and a varying burner or a fixed burner and a varying rate. With a given burner and varying qualities of gases, a constant rate of 5 cubic feet an hour was unscientific. In addition, at the 5 cubic feet rate the difference was a varying one; it depended upon the chemical composition of the gas. He did not agree with the report of the Departmental Committee which said: "The matter is solely one of nomenclature." It was inaccurate, when dealing with a 14-candle gas, to make an allowance of 1 candle. There was more than 1 candle difference between the two methods. With regard to uniformity, the method could not be uniform if the different qualities of gases were supplied at the same rate, with the same burner.

CROSS-EXAMINATION BY SIR RALPH LITTLER.

Sir RALPH LITTLER: Had you as much experience last year as you have now?

Witness: Not of trying the two methods side by side. I am satisfied that the difference suggested by one witness before the Departmental Committee, of 1 candle, is not an accurate measure of the difference between the two methods.

There are many hundreds of provincial companies?—Yes.

How many of them have special burners?—Nearly all new 14-candle gas companies have special burners.

Is it not a fact that there are very few who have special burners?—There are only a few.

MR. THOMAS GOULDEN, EXAMINED BY MR. BALFOUR BROWNE.

Witness (who is Chief Engineer of the Gaslight and Coke Company) said that his Company were bound to supply 16-candle gas; and the test of 5 feet an hour did no injustice to it when it was in the neighbourhood of 16 candles.

Mr. BALFOUR BROWNE: But you, with your experience as Chief Engineer to the Company, can you tell the Committee, as a practical matter, whether it is a fair thing to supply gas at 5 feet an hour when the gas varies in quality?

Witness: It is not a fair thing. The difference in the apparent value varies in a far greater ratio than the ratio in which the gas is reduced.

Would you agree as a practical man that at 14-candle power the gas ought to be burnt at the rate of 5·7 feet an hour?—Entirely, in the "London" argand burner.

The whole object of testing being to find out what gas the Company are supplying to the public, ought that test to do full justice to the gas?—Yes.

SPEECH FOR THE GAS COMPANIES.

The CHAIRMAN: We understood Professor Vivian B. Lewes would have been here.

Mr. BALFOUR BROWNE said he should like to call him very much; but he was not there. There had been some misunderstanding. It was thought the case would last till 2 o'clock, and he was coming then; but, of course, they could not ask the Committee to wait for him. He was glad that the Chairman had pointed out yesterday that the Companies' clause was one which was difficult to understand; but to-day, at any rate, he thought the matter had been made abundantly clear. It was a curious thing that the County Council should take advantage of what was really, he ventured to say, a slip upon the part of the Departmental Committee. He did not want to say one word against the members of that Committee; but everybody was liable to make a mistake, and he was sure, after the evidence which had been given before the present Committee—the very best evidence procurable with regard to photometric questions in relation to gas—they must come to the conclusion that a mistake had been made by the Departmental Committee. Their object was admirable. It would be for the convenience of everybody to have a uniform test, though it was not so important as it seemed at first sight. Uniformity would be a very important matter if the tests were to be made by the public; but when they had to be done by experts, as was the case, the mere variation in one element in the testing was not so important. If one added unequals to equals, the whole was unequal; and the gas must be burnt at different rates according to its quality if the same burner were to be used. The public turned the gas up and down—that was, they supplied more or less cubic feet per hour, until they got the best light; and the scientific method of testing the gas was precisely the same. Why he objected to the County Council Bill was that they merely founded themselves on those two paragraphs in the report which had been quoted, which he ventured to say were a mistake, and wanted to do an injustice to the Company. Their view, curiously enough, was only supported by one witness—Professor Clowes, who was a servant of the County Council. There was another statement in the report, which was obviously an error. Paragraph 11 stated: "The issue would be of greater importance to the Company if it were proposed to alter the actual quality of the gas they are required to supply; but that is not the case." Therefore the Gaslight and Coke Company were to go on supplying 16-candle gas, and the South Metropolitan and Commercial Companies 14-candle gas. Then they fell into the error: "The matter is solely one of nomenclature." If that were so, the Gas Companies would not be there fighting. If the two lines were always parallel, there would not be so much objection, though he did not like his gas to be called 13-candle gas when it was really of 14-candle power. But the lines were not parallel, as was seen from Mr. Dibdin's chart. It was necessary to have a standard burner, as the Departmental Committee said; and Sir William Ramsay had pointed out that the 14-candle gas was not getting fair play at 5 feet an hour, and that it should be turned up until there were 5·7 feet. In fairness to the Company, and in fairness to the consumer, he asked the Committee to accept Sir William Ramsay's suggested clause. There was only one other point, and that was that if his gas was going to be tested by the method proposed by the County Council, he had to keep it up to a higher illuminating power.

The CHAIRMAN asked that Professor Clowes might be recalled, in order to give his opinion of Sir William Ramsay's suggestion.

Mr. KENNETH BALFOUR asked if there were any figures as to the number of cubic feet of gas consumed by customers using incandescent burners and those using flat-flame burners.

Mr. BALFOUR BROWNE said that 50 per cent. of the gas was used for power, heating, and cooking, and 50 per cent. for illuminating; and of the latter 25 per cent. was incandescent. So that only 25 per cent. of the whole of the gas made was consumed through flat-flame burners on the north side of the Thames.

PROFESSOR CLOWES RECALLED.

The CHAIRMAN: You have heard the suggestion made by Sir William Ramsay. Do you think there is anything unfair in it?

Witness: I think it is simply putting the old method of testing in another shape. I entirely adhere to the Departmental Committee's recommendation. Sir William Ramsay's proposition was practically before that Committee, though not in those precise words.

Do you think the suggestion would be fairer to the Gas Companies than the suggestion of the Departmental Committee?—I think it will give in a more true way the highest value which the gas can give by being burnt. That is stated by the Departmental Committee. I think if we were asked to state what would be the very best value to give to the gas, we should burn it in that way. We should have to give that higher rate of consumption. But we are not doing that. We are simply fixing a standard for our testing. What the standard is does not matter, so long as we adhere to it. Fixing the one standard which the Committee have done is a very great advantage. Sir William Ramsay's suggestion introduces complication; and there is no end to it if you once introduce it.

What extra trouble would it give to have this test instead of the one you propose?—There is actually more trouble in putting the consumption at 5·7 feet. That is what one of my gas examiners tells me. I rather take that from him.

Mr. BALFOUR BROWNE: With regard to simplicity, if the Committee would like to see it the apparatus is downstairs in one of the rooms of the House. You can see how very simple it is.

The CHAIRMAN intimated that the Committee would inspect the apparatus at the close of the day.

SUMMING UP FOR THE COUNTY COUNCIL.

Sir RALPH LITTLER then summed up the case on behalf of the County Council. He expressed surprise that Mr. Balfour Browne should have suggested that a slip had been made by the Departmental Committee, seeing that they went on for 21 days and had had full evidence on the subject. He would be very glad if the Committee would ask Lord Rayleigh or Mr. Fletcher Moulton whether any slip had been made. He would be quite content if they said there was a slip. There was a very good reason why all the outcry was made. Sir George Livesey had said this in his evidence before the Departmental Committee: "If, as I hope, the quality of gas is going lower, then it is utterly impossible to test 12-candle gas with a 16-candle burner." This was the point; Sir George wanted to get a lower quality of gas. Continuing, he urged that the recommendation of the Departmental Committee should not be departed from.

At the close of his argument,

The CHAIRMAN said the Committee would defer their decision on this point to a later stage.

OTHER CLAUSES OBJECTED TO.

A discussion then took place as to the clauses in the London Gas Bill which were objected to by the Gas Companies, from which it appeared that clauses 10, 13, 15, and from 17 to 22 inclusive were not objected to; and on many of the others the points were trivial.

In answer to the Chairman,

Sir RALPH LITTLER said that clauses 7 and 8 were the only two in which it could be suggested that there was any departure on the part of the County Council from the recommendations of the Departmental Committee. There was no doubt that, with regard to clause 8, the Committee did not recommend any alteration of the standard price, as the County Council did.

Lord ROBERT CECIL: On the contrary, they recommend that there should be no alteration.

Sir RALPH LITTLER: With regard to clause 7, we accept, though we do not like it, the suggestion of the Committee; but we propose that a record shall be kept by the Gas Referees, and if it should turn out that there is any inconvenience, as we fear, then the Board of Trade should be empowered to act. This *via media* of ours was not considered. They recommended, and we accept, the repeal of the sulphur clauses. But we say it would be a great advantage to have a record kept, because it is a very serious question; and if it should turn out that our fears are verified, then this should simply be a suspensory clause and the Board of Trade should say it should come to an end.

Lord ROBERT CECIL said that clause 16 was not exactly against the Departmental Committee; but there was nothing in the Committee's report to support it. It was entirely outside.

The CHAIRMAN: Do you ask us to go directly in the face of the Departmental Committee in any of these clauses?

Lord ROBERT CECIL: I think clause 5 is the only one in which we shall ask your decision; and there we shall be putting forward something which must fairly be said to be not in accord with the Departmental Committee. As to the other matters in which we differ with the County Council, it is really more a question of what is the true interpretation of what the Departmental Committee said.

Sir R. LITTLER was proceeding to open the case on clause 5, when

Lord ROBERT CECIL said he had been speaking to his clients; and if the Committee would adjourn at once, before they met again they would discuss matters with the County Council and see if the labours of the Committee could not be shortened by arriving at some compromise on smaller matters. The principal points remaining were the sulphur clause and the standard price.

The Committee then adjourned till yesterday (Monday). The proceedings then will be found summarized on p. 764.

UNOPPOSED BILLS.

Last Thursday, a group of Unopposed Bills came before a Committee of the House of Commons—the Right Hon. A. F. JEFFREYS presiding.

Provisional Orders (No. 1) Bill.

The following Local Government Board Provisional Orders were first of all dealt with: Ashton-in-Makerfield, Southport, Ulverston, Newbury, and Burslem. The Ashton-in-Makerfield Order asked for increased borrowing powers from £15,000 to £25,000 for the purposes of the gas undertaking. The Southport Order sought increased borrowing powers from £16,500 to £31,500 for the purpose of purchasing gas cooking-stoves, meters, burners, and other fittings. Increased borrowing powers from £5000 to £12,000 were desired by the Ulverston Order for the purposes of the gas undertaking. In the Newbury Order, an increase of the borrowing powers from £10,000 to £20,000 for the purposes of the gas-works was asked for. The Burslem Order sought, for a similar purpose, an increased borrowing power from £15,000 to £25,000. The preambles were found proved.

Brompton, &c., Water Bill.

The preamble of the Brompton, Chatham, Gillingham, and Rochester Water Bill was also proved.

Accrington Gas and Water Bill.

The Accrington District Gas and Water Board Bill was next on the list. Mr. Anderson (the Agent) said the Bill was to take powers to protect the drainage area, to increase the storage of their reservoir, to add to their water rights, and to extend their area of supply. The preamble was proved.

Walker and Wallsend Gas Bill.

With regard to the Walker and Wallsend Gas Bill, the Agent said that this was a measure simply to enable the Company to acquire some land to enlarge their works. Sir Chandos Leigh said he understood that this was originally a very big Power Bill, both electricity and gas. Then the Company parted with their electric scheme to another concern. Now they were purely a Gas Company? The Agent replied that they were. The preamble was found proved.

HOUSE OF COMMONS COMMITTEE.

Tuesday, March 14.

(*Before Captain* JESSEL, *Chairman, Mr.* RECKITT, *Mr.* PEEL, *and Mr.*. HIGHAM.)

SUNDERLAND AND SOUTH SHIELDS WATER BILL.

This Bill, the object of which is to authorize the Sunderland and South Shields Water Company to construct additional works, raise more capital, extend the limits of supply, and confer further powers on the Company, came before the Committee to-day.

Mr. BALFOUR BROWNE, K.C., Mr. CLAUDE BAGGALLAY, K.C., Mr. VESEY KNOX, and Mr. HOLMAN GREGORY appeared for the promoters. The petitioners in opposition were represented as follows: Sunderland, South Shields, and Jarrow Corporations and the Hebburn Urban District Council, by the Hon. J. D. FITZGERALD, K.C., Mr. HONORATUS LLOYD, K.C., and Mr. JEEVES; the Hartlepool Gas and Water Company, by Lord ROBERT CECIL, K.C., and the Hon. F. THESIGER; Mr. J. S. G. Pemberton, the Wearmouth Coal Company, and the South Hetton Coal Company, by the Hon. J. D. FITZGERALD, K.C., Mr. FREEMAN, K.C., and Mr. SIMEY; and the Sunderland Rural District Council, by Mr. LYNDEN MACASSEY.

THE CASE FOR THE BILL.

Mr. BALFOUR BROWNE, in opening the case, said the Company was incorporated in 1852, and had an area of supply of 112 square miles, which included the towns of Sunderland, Jarrow, and South Shields. The total population was about 400,000. The water supply was drawn from wells, which went down from 150 to 500 feet to the magnesian limestone and the sands beneath, below which were extensively worked coal measures. The water was exceptionally pure, and was absolutely free from organisms; its only bad quality being that it was a little hard. The present sources were, however, nearly exhausted; and in order to obtain a further supply, the Company were going to the district to the south of their present area, and this would be added to that area. Opposition to the proposal was offered by the Hartlepool Gas and Water Company, who said that they might want the water for the district in question, and that it ought therefore to be left for them. The Hartlepool Company, however, were in Parliament not very long ago, and they did not propose either to take water from the district or to supply it. They also said that they had certain gas and water works for the supply of Hartlepool, and that if the promoters pumped water to waste, it might get into their reservoir, and possibly make their water harder than it was. There was something in this point, and to meet it the promoters would agree to take precautions so that if, during the construction of their works, they did pump water to waste, none of it should get into their neighbours' reservoir. The population of the district had risen from 309,000 in 1891 to 400,000 now; and, to show the more liberal use of water in the district for sanitary purposes, the number of closets had increased from 3754 in 1879 to 5262 in 1891 and to 15,539 in 1904. Further, the fixed baths had been more generally adopted. The present unexhausted money powers of the Company amounted to £273,000. The capital sought by the Bill was £600,000, with borrowing power as to £150,000 more, which, with the capital in hand, would make £1,023,000. The works proposed, such as pumping-stations and lines of pipes, would cost £575,900, and other works, such as main extensions, to meet the development of the locality, would require £400,000 in the next 15 years—making a total of £975,900. Consequently, there would be a balance of only £47,100 at the end of 15 years, which period, it was submitted, was not too long for a company to remain away from Parliament. The present capital was made up as follows: Share, £900,000; loan, £212,500; and premiums, £126,590—total, £1,239,090, of which £965,965 had been expended. Of the balance of £273,125, they were already committed to the expenditure of £180,000 for extensions of mains, &c.

THE OPPOSITION.

The opposition of the Corporations of Sunderland, South Shields, and Jarrow was not directed really against anything in the Bill, but referred largely to the present doings of the Company. They said the Company should soften the water they supplied; and although this process would entail expenditure, and the benefit go wholly to the manufacturers using the water, the Company were not to be recompensed at all for their outlay. Then they asked that the water-closet flush should be three gallons instead of two as at present. The answer to this was supplied in the report of Colonel Ducat, some years ago, in regard to an inquiry held in London under the Local Government Board, in which it was stated that the two-gallon flush had been found to be sufficient and satisfactory. In the petition of Mr. Pemberton and of the two Colliery Companies (his tenants), complaint was made that the promoters were pumping water from the underground strata, which caused subsidence of the surface; and they said that they, as the proprietors of the undertakings, were at present held liable for these subsidences. Counsel urged, however, that it was well established that no surface proprietor had any right to support from underground water. Further than this, it was not the fact that the taking of water by the promoters had any effect on the surface. The removal of coal did have such effect; and an action was pending now between the promoters and one of the Colliery Companies, because the Company had, by taking away coal from beneath a reservoir, caused serious damage to it. The object of the petitioners was really to obtain a modification of past legislation, which, of course they had no right to do. In his petition, Mr. Pemberton submitted that it was unjust and inequitable that the promoters should be permitted to raise underground water and exercise their powers for this purpose without being liable to pay compensation. Thus he asked the Committee to alter the general legislation, and make the promoters liable at common law, though at present they were not liable. Counsel then referred at some length to the petition of the Hartlepool Gas and Water Company, in which objection was taken to the sinking of wells in the area proposed, because pumping there would interfere with their wells; and they asserted that when the area in question required a supply, they would undertake to give it. In the petition of the three Corporations, a variety of points were raised, such as that the rates of the Company were high, the method of assessment inequitable, the capital power sought much in excess of what was required, the pressure insufficient, &c. These points were briefly dealt with, and the learned Counsel closed his address.

EVIDENCE FOR THE PROMOTERS.

Mr. *R. H. Gaynor*, the Chairman of the Company, was the first witness called. In cross-examination by Lord R. CECIL, he said the greater part of the Company's supply was given in the northern portion of their district. The proposed area was to the south, and adjoined that of the Hartlepool Company. Power was sought by the promoters to sell water beyond their limits after the wants of their own district had been met. The proposed additional area was mainly agricultural. It had a population of 6000, of whom not less than 5300 were contained in three parishes. He did not know that the proposed additional area was diminishing rapidly—that the population in 1891 was nearly 9000, against 6000 now. The promoters did not say there was a growing need in that area; but such need as existed they would meet. He knew that the population of Hartlepool had increased very largely. Asked whether, with a population of this kind, it was rather important that no water supply adjacent should be sacrificed, he said the Hartlepool Company had reported that they had ample water for ever. Their supply was drawn from boreholes which he understood were not far from the sea. The promoters had had to abandon one well at Cleadon because sea water penetrated into it. Asked if he would give an instance of a water company going down 20 miles, surrounding, or nearly surrounding, the district of another company, and taking possession of the district where the reservoirs of the other company already existed, witness remarked that Birmingham went a long way further than that.

Wednesday, March 15.

Mr. *W. Armstrong*, the Chairman of the Water Committee of the Easington Rural District Council, said the area of the Council contained a population of 45,000, and embraced a large number of parishes, of which six were within the Company's present district of supply and five within the proposed new area. His Council had obtained water for the six parishes from the promoters, and there had never been the slightest question about the quality. There was a demand for water in the parishes in the proposed area of supply, and it would unquestionably be to the advantage of the inhabitants if the Bill were passed. The Council heartily approved of it. He did not think it possible that the proposed wells could interfere with the water which the Hartlepool Company obtained from their wells. At Wellfield and Wingate, a well was sunk within a mile of an existing well; but the one did not interfere with the other.

Local medical witnesses were then called, who testified to the good quality of the water sent out by the Company, and as to the freedom from bone diseases of the inhabitants of the area supplied. One of these witnesses objected to any doctoring of the water to render it less hard, on the ground that it would destroy its delicious character as a drinking water.

CHEMICAL AND ENGINEERING EVIDENCE.

Mr. *Otto Hehner* said the whole area from which the water of the Company was drawn was magnesian limestone, with a certain sand formation underlying it. He had examined samples of water taken from all the different sources of the Company. It was a perfectly typical magnesian water, and was admittedly organically pure, and for dietetic purposes exceptionally good. Samples he had examined of the Hartlepool Company's water showed that it was much harder than that of the promoters, and that it certainly had no advantage over it. The Sunderland Company's water lent itself to softening only with particular difficulty, because the hardness was largely due to the presence of carbonates, and because the magnesian limestone rather impeded softening processes. Further, these processes in the case of drinking water were highly undesirable from every point of view of public health. Water as hard as this was supplied in other places.

Mr. *Charles Hawksley* said his father, and subsequently witness and his son, had been concerned for the Sunderland Company's undertaking since its establishment. Of the total population of 460,000 in the area, the Company supplied about 380,000. The ten wells of the Company at present yielded some 9½ million gallons daily; and the Company had actually delivered in the maximum fortnight of supply a daily average of 8½ millions. Thus the time had arrived when, in order to provide for future requirements and to allow a proper stand-by, the Company should sink more wells. From two wells now being sunk a daily yield of 2 million gallons was expected; while from the four wells proposed in the Bill a further supply of 4 millions was hoped for. Thus the resources would be increased to 15½ million gallons daily; and as he calculated that by 1920 the average daily supply in the maximum fortnight would be about 13½ million gallons, the margin would only be about 2 millions daily, which was not more than the Company would need to place themselves in a safe position. The chief works proposed under the Bill were four pumping-stations and two service reservoirs, with the necessary connecting pipe-lines; the estimate for the total works proposed being £575,900. The only area to which the Company could go for more water was the one selected to the south, because, first, they were hemmed in by other companies on the one hand, and, secondly, because the limestone did not extend very far to the west. The promoters could supply this area, and they proposed to take power to do so. The capital sought in the Bill would, he calculated, carry the Company on for about 15 years. He anticipated that the consumption per head would increase owing to the more liberal use of baths and closets, and to the water-carriage system of sewage being rapidly pushed forward in Sunderland. Turning to the allegations of the petitioners, he denied that the charges of the Company were high; and he produced a table showing that the average of 19 local authorities (all those in the country who governed populations of more than 100,000, and possessed their own water supply) were above the charges of the promoters. He objected to any alteration of the

basis of charge; holding that the present system—the rack-rent—was the most equitable. Having quoted the report of Colonel Ducat, in opposition to the proposal to alter the quantity of the water-closet flush, witness stated that the cost of softening the water, as requested by some of the petitioners, would amount to from 1¾d. to 2¾d. per 1000 gallons, without making any allowance for interest on the capital employed. If the consumers desired that the water should be softened, and if they defrayed the cost, there would be no objection to softening it. To increase the pressure, the Company had recently relaid some large main pipes as well as some small ones. Large sums had been spent with this object, and the construction of the Downhill reservoir would much improve the pressure in South Shields and Jarrow.

In cross-examination by Mr. FREEMAN, witness said he knew of no case in which the pumping of underground water, in such formation as existed in the Company's area, had lowered the surface,

Cross-examined by Lord R. CECIL: If the West Hartlepool Company wished to extend their supplies, they would no doubt go to the area proposed to be utilized by the promoters; but presumably they would first exhaust their own area, which was a large one. That Company had several miles of limestone lying to the west of Hartlepool, which was entirely unused.

Thursday, March 16.

Mr. *Hawksley* was further examined by Mr. HONORATUS LLOYD, at some length, with regard to the cost of softening the water and the insufficiency of pressure, which it was suggested was maintained in the Company's mains. With reference to the meter clause, he denied that the object was to sell meters instead of letting them by hire. The Company much preferred to let them on hire. They had this power at present; and he would be content to have the clause modified so that they could not sell them. The other part of the clause—giving power to sell water-fittings—was intended to afford facilities for obtaining such articles instead of leaving the plumbers to go to the manufacturers as at present.

Professor *Frankland* gave evidence in favour of the quality of the water supplied by the Company, and in opposition to the suggestion that it should be softened by them.

PUMPING OPERATIONS AND SUBSIDENCE.

Mr. *John B. Simpson*, a mining engineer, said he had never in his experience of forty years known of a subsidence caused by the pumping out of water. Where surface subsidences had occurred in collieries with which he was connected, coal beneath had been extracted. He held that there was no possibility of injury to surface land by the pumping operations proposed by the promoters.

Mr. *Henry S. Childe* confirmed the evidence of the last witness.

Mr. *E. M. Eaton* thought the estimated increase of population in the Company's area, of 5000 persons per annum, quite reasonable. Though the district was only taking 20 gallons per head daily or thereabouts, at the end of the period for which the estimates for these works were prepared the consumption would have increased to 25 gallons daily in the urban districts, and to 15 gallons daily in the rural districts. He confirmed the engineering evidence already tendered; and, in regard to the allegation that the pumping of water by the Company caused subsidence, he said he never heard of such a thing until this case. The suggestion seemed to be impossible, because the material could only be taken out in suspension or in solution. In the former case, it would be fatal to the Company's works; in the latter case, the material in solution would be so small that it could only come from the top of the limestone or from the side of the fissures in which the water passed down. To cause subsidence of the surface, it must be from the top, because they could not dissolve the limestone out from the bottom and lower the whole mass of 400 feet in thickness. He failed to see how the suggestion could be made seriously.

This closed the promoters' evidence.

Friday, March 17.

THE CASE FOR THE OPPOSITION.

Mr. HONORATUS LLOYD, in opening the case for the Corporations of Sunderland, Jarrow, and South Shields and the Urban District Council of Hebburn, said he represented 320,000 out of the 390,000 consumers of the promoting Company's water. His clients had no desire to at all harass the Company, but were most anxious to secure for them an adequate supply of water of suitable character. They therefore applied to Parliament for assistance. The water supplied had been of exceptional hardness, though they knew from the experience of many other places that the reduction of the hardness to 12 degrees would not deteriorate it for drinking purposes, while immensely improving it for domestic and manufacturing uses. Further, the mains of the Company were too small. Repeated complaints led to some of the pipes being taken up, when it was found that they were so furred that they possessed only half their supposed capacity for conveying water. The Company said they were performing their statutory duty. But they were not subject to the general law in regard to pressure, because while the general law said that they should give a supply at such pressure as would reach the top storeys of the houses, under a Special Act of the Company it was sufficient if they supplied at such pressure as could be given from the reservoir from which they actually supplied.

The CHAIRMAN: Do you admit that the pressure is enough if the mains were large enough?

Mr. HONORATUS LLOYD: Yes. Continuing, he asked that, if the Committee passed the Bill, they would insert a clause that the Company should provide adequate mains for the purpose of giving a proper supply for all domestic purposes, and that when any question arose between the local authority and the Company as to the adequacy of the mains it should be referred to an arbitrator. The matter of softening the water was one merely of cost; and he contended that this expense should be borne by the promoters, because they were under the obligation to supply pure and satisfactory water. His clients alleged that the charges of the Company were too high; but as he was asking the Committee to cast this burden on the Company, he would not ask them to reduce the charges. If the Committee thought the water should be softened, and an application to Parliament by the Company for a Bill to increase their charges were necessary in consequence, he, on behalf of the Local Authorities, would undertake to raise no objection on principle. His clients regarded the proposal to supply in bulk outside their area as very serious; and they therefore asked that such power, if granted, should only be exercised with their consent. The matter of the increased water-closet flush he would abandon, together with the contention that the charges of the Company should be reduced, if thereby he could ensure that the softening of the water would be undertaken. Lastly, he urged that the Company sought to raise an unreasonable amount of capital—much more than would be required for the next fifteen years. He therefore urged the Committee substantially to reduce it.

THE QUESTION OF SOFTENING THE WATER.

Sir *James Dewar* stated that he had examined a sample of the promoters' water, the hardness of which was 24·1 degrees. After softening, the objectionable magnesium salts were reduced from 4·18 grains to 0·94 grain per gallon. There was nothing to prevent softening being carried out on a commercial scale; and the result would be an undoubted improvement of the water.

Sir *William Crookes* confirmed in its entirety the evidence of the previous witness. In reply to the Committee, he said softening the water would minimize the amount of deposit in the mains—practically there would be no deposit.

Mr. *C. E. Matthews*, the Water Engineer to the Corporation of Southampton, believed that the water could easily be softened to 13 degrees of hardness at a cost not exceeding ¼d. per 1000 gallons, allowing 5 per cent. for interest on the capital employed, and supposing a million gallons daily were treated at each station.

Mr. *Snell*, the Electrical Engineer to the Corporation of Sunderland, said he advised the Corporation to soften the water used at the electrical station, because the boilers and feed-pipes became quickly furred. Lime and soda were used for the purpose; the cost amounting to 0·485d. per 1000 gallons treated, or, with capital charges of 0·178d. to 0·653d. per 1000 gallons. He presumed softening in this way would not be suitable with water for domestic consumption.

In cross-examination, witness said he had not included in his figures anything for labour or renewals of machinery; but these items were so small as to be absolutely negligible.

Mr. *John Pattinson* said he regarded the excessively hard water of the Company as objectionable for use in steam-boilers, for washing, and many other purposes, and declared that 15 degrees of its hardness could easily and inexpensively be removed by the lime process.

Other evidence having been given, the Committee adjourned till to-day (Tuesday).

POLICE AND SANITARY COMMITTEE.

MORLEY CORPORATION BILL.

This Committee, which is presided over by Mr. J. W. WILSON, had under consideration on Friday last the Bill promoted by the Morley Corporation, which has relation, among other matters, to the water undertaking.

Mr. WEDDERBURN, K.C., and Mr. JEEVES appeared for the promoters; the Hon. J. D. FITZGERALD, K.C., and Mr. TALBOT represented the Batley Corporation, who opposed.

Mr. WEDDERBURN said he was happy to tell them that there was now no opposition to the Bill. The position was this. Clause 11 provided for contracts to supply water in bulk to other local authorities and persons. They never had any idea whatever of supplying in the borough of Batley or in their water limits; and they thought they had arrived at that result in their clause. However, they had met and fully discussed the matter; and they had now altered the clause to a form which suited Batley. They proposed to be allowed to supply water in bulk by agreement, providing that such supply should not be given under the powers of the section, except with the consent of any local authority, company, or person.

Mr. TALBOT said that Batley were content with the alteration.

Mr. WEDDERBURN then dealt with the position of Bradford. Had Bradford appeared in opposition, there would have been a good deal to say on what was the position taken by Bradford in the matter. It shortly came to this. Discussions had from time to time arisen as to what the Bradford rights were in regard to the supply of water in their area. As a matter of fact, Morley and nobody else was supplying Gildersome. Gildersome was in the water area of Bradford; and some time back, when they were first asked to supply Gildersome, Bradford objected very strongly. Bradford had been supplying them; but Gildersome desired to be supplied by Morley instead. There was an inquiry held by the Local Government Board; and Bradford brought an action for an injunction. Then they withdrew their action; and the Local Government Board decided that Morley might supply. Since then they had supplied; but a fresh difficulty had now arisen. It appeared that in the Halifax Act of 1892 there was a clause which seemed to be difficult of interpretation; and the result was that Bradford had an action pending to decide precisely what the meaning of the clause in that Act was. This decision would determine altogether what the rights of Morley might be to carry certain Halifax water, if they decided to do it, to Gildersome.

Mr. *Rhodes, J.P.*, the Chairman of the Water Committee, gave evidence approving the extension and the desirability of having a reservoir near the Halifax reservoir.

Mr. *W. E. Putman*, the Engineer, said the estimate for the conduit from Brighouse to Morley was £20,000, including a margin of £3000 in case of fluctuations in prices of materials.

The promoters asked for a period of sixty years over which to repay the borrowed money; but the Chairman said the Committee did not feel disposed to give them so long. They would grant fifty years.

The Committee then dealt with clauses, and the Bill was ordered for third reading.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—KING'S BENCH DIVISION.

Wednesday, March 15.

(*Before Mr. Justice* DARLING *and a Special Jury.*)

Ogden and Another v. The Gaslight and Coke Company.

In this case Miss Beatrice May Ogden, of Margate, and Mr. Abraham Parkes Smith sued the defendants to recover damages for injuries sustained through their alleged negligence. The defendants denied that they had been guilty of any negligence.

Mr. CLAVELL SALTER, K.C., and Mr. JOHN HARRIS appeared for the plaintiffs; and Mr. DANCKWERTS, K.C., and Mr. VAUGHAN WILLIAMS represented the defendants.

Mr. SALTER said in this case the Jury had to inquire into an accident of a somewhat novel kind; and it raised a question of some importance as between gas companies and the public. It was desirable that it should be ascertained how far an accident such as that which happened to plaintiffs was reasonably preventable by those who were responsible for the gas supply of the Metropolis. The Jury would know that there were laid down along the pavement in many streets series of conduits for telephones, and at short intervals there were small boxes into which those who had charge of the telephones could get to deal with any faults in the cables. In the roadways there were the gas-mains and supply-pipes. What happened here was that, owing to a leakage from the pipes, gas escaped and accumulated in the telephone boxes and conduits. In the course of some usual repair work, the liberated gas became ignited, with the result that a series of explosions took place. Four of the heavy iron covers of the boxes were blown off, one after the other, and the two plaintiffs, who were passing at the time, were seriously hurt. With regard to the extent of the injuries, the parties had been able to arrange the question of damages, so that the only point for the Jury was as to the liability of the Company. The accident happened on the 15th of October, 1903, in the neighbourhood of Glasshouse Street, Regent Street. The explosion originated in the box at the corner of the first-named street; and the question was as to who was answerable. Defendants, who supplied the gas to the district, were responsible for the construction and maintenance of the mains and supply-pipes, and they had statutory as well as common-law duties. The former were set out in section 24 of the Gas-Works Clauses Act, 1847; and they had to exercise the greatest care in the interests of the public. Some time before the explosions occurred escapes of gas had been detected in the vicinity, both by Post Office officials and by other persons. In July, 1903, the workmen employed in the boxes found that there was an increasing smell of gas; and on the 30th the matter came to the attention of one of the superior engineers, who caused a formal written complaint to be made to the Gas Company. After this, the Company endeavoured to find an escape of gas by an indicator, but said they were unable to do so. Nothing was done until October. On the 15th of that month, two men from the Post Office were doing some work in the chamber at the corner of Glasshouse Street, when one of them had occasion to apply a light to the orifice of the pipe containing the cables. A series of violent explosions immediately occurred in four of the boxes farther along the street. The man escaped pretty well, because the box had been open for some time; and he only felt the effects of the flame. The violence of the explosion spent itself in the next four boxes, which were closed, and the covers of which were blown off in succession. Plaintiffs complained that the Company had not taken the proper steps to uncover the pipes and see where the leak was in July, and that their Inspectors were negligent in not being aware of what everyone in that neighbourhood knew—that the gas was escaping badly before the 15th of October. The result of their negligence was that on July 21, 1904, another explosion occurred at the two boxes which were blown up in October, 1903, and another person was hurt.

The following evidence was then given.

Edwin Reed, a commissionaire, employed by Messrs. Nicoll and Co., Regent Street, gave evidence that on the 15th of October he detected a smell of gas, and saw the explosion. In cross-examination, he said he believed it was gas he smelt, and not the creosote which was used for repairing the wood paving. The road was often being patched up.

Henry Male, another commissionaire, gave similar evidence.

James Edwards, carriage attendant at Messrs. Liberty's, also remembered the explosion, and said that for three days previously he had smelt gas escaping, but did not call the attention of any of the Gas Company's officials to the matter.

Frank Edwards, a jointer, formerly employed by the Post Office, said that on the day in question he was working with Edward Wood in the chamber at the corner of Glasshouse Street and Regent Street. They were repairing a fault on a lead cable in the box, and when he applied his light there were several explosions along the street in the other boxes.

Cross-examined: About that time the Post Office were having the box open almost daily. He had not opened any of the other covers on that day. He did not pull the cable out of the pipe, but merely had to lengthen it by putting a fresh piece in, 8 inches away from the pipe. He smelt gas when he first opened the box, but the odour went off before he applied the light. He thought there was something in the pipe that caught fire. If he had previously lifted the cover to the north, a draught would have been created which would have carried any gas away through the pipe.

In reply to his LORDSHIP, witness said he had detected a smell of gas in the box some time before the 15th of October. It was not usual for him to smell gas in other boxes in which he worked.

Edwin Wood, the mate of the previous witness, corroborated his evidence. He said the box was cleaned out nearly every morning, and he had smelt gas in it on several occasions before the accident. He said so when the cover was taken off on the 15th of October.

Mr. *G. E. West*, a sub-engineer to the Post Office, said he went to Regent Street directly he heard of the explosion, lifted all the covers that had been replaced, and smelt gas.

In reply to his LORDSHIP, witness said he thought the boxes were ventilated, because the covers fitted very loosely. There must have been a serious leakage to make the covers blow off.

Mr. *William Noble*, Assistant Superintending Engineer to the Central London postal district, said the covers were not hermetically sealed; and fitted very loosely. It would, in his opinion, be a very mixed blessing if the boxes were ventilated, as has been suggested by his Lordship, because if there was an escape of gas, and someone passing by threw down a lighted match, there would be an explosion. They had 50,000 of these boxes, and some of them had been in use fifty years. They had had very few accidents, as the boxes were constructed at present; and he was afraid if they were ventilated, accidents would be more numerous. It was better to keep in the gas. He was present in July, 1903, when gas was smelt in Regent Street, and gave instructions for a formal complaint to be lodged with the Gas Company. He also attended in April, 1904, when there were indications of leakage. In July, 1904, explosions occurred in the two boxes which were blown up in October, 1903. There were 17,000 boxes in his district; and in his experience of upwards of three years, he only remembered one other explosion—near Spring Gardens. Since July last, he had not heard of any further trouble with these boxes.

Cross-examined: He was not a gas engineer, but an electrical engineer. There were two pipes running into the Glasshouse Street box, which contained, in October, 1903, altogether 15 cables. The box was built of brickwork, with a foundation of concrete and cement; and the gas might have got in through the soil at the sides. He could not say anything as to the likelihood of any gas that was floating about being sucked into these boxes. He did not know that it was impossible to make gas-pipes absolutely tight. His subordinates had strict instructions to make a report whenever they smelt gas. He knew that no complaint was made between July and Oct. 15, 1903. The next complaint was in January, 1904; and there was not another until April, when four days were spent in investigation. A 2-inch service pipe was then repaired; but he did not know that the same pipe had been examined on Oct. 16, 1903, and found to be sound. The Board of Trade regulations for the public safety in connection with electrical enterprises specified that "reasonable means shall be taken by the undertakers to prevent accumulation of gas in such receptacles."

Mr. DANCKWERTS: What precautions do the Post Office take for the purpose?

Witness: So far as these footway boxes are concerned, there is nothing further than that they are not hermetically sealed, like the electric light boxes. Our boxes are not dangerous, except in the case of a naked light; whereas the high voltage in the electric boxes is dangerous.

Mr. DANCKWERTS pointed out that in February, 1895, Major Cardew reported to Parliament that, in his opinion, a system of thorough ventilation of street boxes by forced draughts should be adopted, and everything done to make the sides and bottoms of the boxes impervious to gas.

Witness admitted that these boxes were not constructed in that way. He said it was impossible for any telephone wire to set fire to an escape of gas. Major Cardew's report had reference to electric lighting mains. It was not true that the National Telephone Company were compelled to construct their boxes in the way Major Cardew had recommended, because it was impossible for any sparking to occur. His experience of electric lighting boxes was that they were not impervious, and that no attempt was made to make them so.

Mr. *William Sullivan*, a telegraph engineer in the service of the Post Office, said Mr. Noble instructed him to write a complaint to the Gas Company respecting a strong smell of gas in the box at Glasshouse Street.

John Prendergast, outdoor foreman in the Telegraph Department of the Post Office, said he recollected reporting the smell of gas in the Glasshouse Street chamber in July, 1903. Before that he had smelt gas, on and off, for three months.

Mr. *Charles Crompton*, a sectional engineer of the Post Office, now at Bradford, said that on the 15th of October he visited the scene of the explosion. In January, 1904, he inspected all the boxes in Regent Street with Prendergast, and found that the Glasshouse Street box smelt badly of gas. There were indications of the presence of gas in the other boxes. He also visited the scene of the explosion in June, 1904.

Cross-examined: He had not been able to form any conclusion as to the cause of the explosion, as there were no Post Office people in the neighbourhood; but it might have been caused by a stray electric spark. The workmen were instructed to remove the covers some time before applying a light. He was not familiar with the expert methods of finding escapes of gas; but, in his opinion, it was not reasonable to expect the Gas Company to have the road up every time there was a leak. He did, however, consider it was proper that they should look for a leak until they found it.

Re-examined: He did not think that it should be compulsory for these boxes to be ventilated.

Charles Stone, sub-engineer to the Post Office, said he worked under Mr. Crompton. He visited the scene of the explosion on July 1, and inspected the boxes. The Gas Company were then testing for gas, and found indications of it in several boxes.

Mr. *G. H. Bailey* said the Ansell indicator used by the defendants when searching for escapes of gas was very simple to work, and was liable to error. Its mechanism was not very delicate, and in coal mines it had been largely superseded by more reliable instruments. A gas-main should last forty years, and a service-pipe ten years. Leakage in dangerous quantities was certainly preventable. He did not know of any satisfactory way of finding a leak, except by uncovering the pipe or looking to the junctions. The Gas Company were not justified in limiting their area of inspection to the immediate vicinity of a leak, but should go on until they found it.

Cross-examined: If there was a telephone conduit, he should go quite 100 feet along it. He had not had any practical experience as a gas engineer, but believed he was acquainted with most of the methods

used by gas companies in finding leaks. He was aware that in all—even in well-managed—gas concerns there was a leakage of about 7 per cent. All gas-pipes would leak to some extent at the joints, and there was no known way of making them absolutely tight. Thus there was always a smell of gas when the ground was opened near the pipes. In such cases as this, he would expect the gas to collect more in the boxes than in the conduits. Under the old system of macadamized roads, escaped gas had a tendency to find its way through and escape above; but in the new system of putting the pipes below concrete, the gas had to escape laterally, and would probably be carried in the direction of the telephone boxes. If these could be made quite impervious to gas, it would be a good thing; but failing this, he would have a certain amount of ventilation. He had heard that there was an explosion in these boxes in July, 1904, and this might have been due to an electric spark or to a spark caused by a workman's iron heel striking the manhole cover. He should not like to say it was impossible to get sparks from the telephone wires being in proximity to the boxes; but he thought that it was improbable. He knew of no alternative way of finding a leak except by exposing the pipes and looking for it.

Re-examined: The instruments used to detect gas in coal mines were delicate, and required some skill to use. A leak might be very dangerous without increasing the percentage of loss very much on the whole.

This concluded plaintiffs' case.

Mr. DANCKWERTS then submitted that there was no case to go to the Jury; quoting the case of *Price v. South Metropolitan Gas Company**, in which he said it was laid down that to make a company liable there must be such actual negligence as to form the effective cause of the accident. He submitted formally that in the present case there was no evidence of actual negligence on the part of the Gas Company.

Justice DARLING (to Mr. Salter): What is the evidence of negligence?

Mr. SALTER: I say the evidence is that there was an explosion due to the presence of gas in the conduits. The defendants are in charge of all the gas in the neighbourhood; and the facts proved are that by their negligence the gas was allowed to escape. It accumulated in certain places, and thereby eventually caused an explosion. In July notice of the escape was given to the Company; and though certain steps were taken, which may or may not have been sufficient, nothing was done in the way of actual examination of the mains and pipes in which the gas actually was; and then the explosion took place, causing the injury.

Mr. DANCKWERTS said the words of Lord Russell, in the case he had quoted, were that there must be shown the actual negligence which was the cause of the injury. He submitted that no such negligence had been proved, and no failure shown on the part of the defendants in respect to their duty.

Justice DARLING: Is there evidence of the Company doing something or omitting to do something which caused the escape of gas?

Mr. SALTER: Yes, my Lord. I say there is evidence that the pipes were not properly maintained; and, further, I say the Company ought to have discovered and noted the escape.

His LORDSHIP said he must leave the case to the Jury.

Thursday, March 16.

On the resumption of the proceedings this morning,

Mr. *Noble* was recalled, and said it was impossible for the current in the cables to cause a spark. If a spark did get in, it would have to fuse the lead casing before it ignited the gas. On the occasion of the explosion in October, 1903, the cables were found to be intact. The boxes were of the same construction as those used for electric lighting. Electric lighting companies had attempted to ventilate their boxes; but, so far as he knew, there had been no satisfactory results. The companies raised the covers of their boxes periodically, but not nearly so frequently as the Post Office did.

THE CASE FOR THE DEFENCE.

Mr. DANCKWERTS then opened the case for the defence. He said he hoped the Jury would not be tempted, out of sympathy with the plaintiffs, to give a verdict for them because an accident had happened and the defendants were a gas company. The main difficulty in the case was the intervention of the Post Office; but he hoped to show that it was their servants and their works that had caused the catastrophe. There was always a difficulty, when a Government department was concerned in an accident, in getting at them. Gas was a thing which it was quite impossible to prevent escaping. The joints and pipes never could be made absolutely secure; and there were always some small leaks in and around the pipes. Therefore the Gas Company should not be charged with negligence because they could not prevent such leakage. The only obligation on them was to take care that they used the best known practical means for preventing damage being caused by excessive leakage. A modern roadway such as Regent Street was rendered quite impervious; and the small quantities of gas escaping underneath had to find their way below the pavement. It collected in the conduit-pipes and boxes of the telephone and electric light companies; and it was to obviate this danger that the Board of Trade had recommended that the boxes should be made impervious. The conclusion he asked the Jury to come to was that the gas in these boxes did not find its way through the pipes, but through the boxes themselves. The Post Office, if they were prudent, would make the boxes impervious to gas, or would take care that they were properly ventilated. Apparently the boxes in which the explosions occurred had not been opened for some time. It was the junction box which was most frequently opened. If the precaution had been taken of lifting off the next cover, a draught would have been created which would very soon have dissipated any gas that had collected. The worst that would have happened was that the gas would catch fire and burn itself out along the pipes. Therefore the real cause of the explosion was the action of the Post Office men in not taking the most simple precautions. He did not blame the men so much as their superiors, for not giving the men intelligent instructions in regard to their action when they smelt gas in the boxes. The Gas Company were not liable to do anything more than act reasonably; and he submitted that there was no evidence that they had not done so in every respect. But even supposing they had been negligent, he submitted that their negligence would not have had any effect if it had not been for that of the Post Office officials. Therefore, if it was the negligence of these that was the direct and effective cause of the accident, the Gas Company were not liable, even though there might have been some negligence on their part, which he denied. It was absurd to say that every time there was a leakage of gas the roadway should be broken up, as the public inconvenience would be enormous. The Gas Company therefore generally relied on a searcher and on the indicator. When they were informed in July, 1903, of an escape of gas, their men were employed for several days in the neighbourhood in trying to discover a leakage. They were unsuccessful, and were certain there was no leak then, or they would have found it. Having found no leak in August, it was difficult to say what was the cause of the accident. Experience, however, taught them that the heavy traffic of London tended to loosen the joints of gas-pipes; and probably this was what happened in October. It was natural that the Gas Company should take every precaution to prevent loss of gas or the danger of being sued; and their men were constantly on the look-out for escapes. Rewards were paid to them, and also to police constables, for giving information; and therefore it was to their interest to keep the Company well informed. A curious thing happened only the previous night. It was reported to the Company that there was an escape of gas near No. 112, Regent Street. The men went there and examined the ground, and could find no trace of leakage. A shower of rain came on, and they were driven to take shelter under a building where there had been some lamps used by the Stereoscopic Company. The men found that the rain drops brought down a smell of gas. They got a ladder to investigate the matter, and found that the ends of the pipes which had supplied the lamps that used to hang there were open and unsecured, and the gas was pouring from them. They also inspected the meter and found it was working. The lamps, however, had been removed six or seven years ago. He did not know how long this escape had been going on; but it was a very curious circumstance, and might account for the gas which plaintiffs' witnesses said they smelt occasionally when the wind was blowing up Regent Street. He would say nothing more about this circumstance, but would leave it to the consideration of the Jury.

Mr. *G. Marvin*, an inspector employed by the Company, said that on the 15th of October he went to the scene of the explosion with a foreman and some men. They took picks and shovels, a searcher, and three indicators. They applied the searcher at frequent intervals, but could not find any indications of an escape of gas, though they searched from five till nearly ten o'clock. They got the Post Office people to lift five of the covers, and there was nothing but a peculiar smell in one box. The odour was not gas, but was similar to that given off by wooden blocks. They went the following day, and again searched from Glasshouse Street to Regent Place—opening the ground and exposing the main; but the indicators did not record the slightest escape of gas. They had previously inspected the boxes in question in July and August, 1903, in consequence of complaints from the Post Office men; but they could not find any escape then. They went again in January and in April, 1904, and examined the mains, and did certain work to render them perfectly secure. He always attended to make an inspection every time a complaint was received.

Cross-examined by Mr. HARRIS: If there was a leakage, it was sure to be detected by opening the ground; but they might open a great deal of ground before finding it.

Justice DARLING (to Counsel): Are you going to suggest that all Regent Street is to be opened up every time anyone smells gas?

Mr. HARRIS said certainly not; but he thought some portion might be taken up near where the smell of gas was perceptible.

In further cross-examination, witness said it was probable that the smell in July, 1903, was caused by the collection in the boxes of minute quantities of gas, which dispersed the moment the covers were removed. The ground was not opened then, but it was in January, 1904, when they found a joint very slightly leaking. That was shown by the indicator. The ground was also opened on the 27th of April for a slight escape which they had smelt in one of the boxes. On June 9 they located another small leak into one of the boxes (No. 118) from one of the joints in the main. A good gas-main ought to last practically for ever. He found the escape at the Stereoscopic Company's place the previous night, but was unable to state for how long it had been going on. There might have been a small leak which had developed. He could not say how long it was since the lamps had been removed, but it must have been some years ago.

Mr. *J. C. Hammond*, mains foreman to the St. James's and Pall Mall Electric Light Company, said the Company had upwards of 2000 boxes in their district. A large number were ventilated by means of the guard-posts on the kerb, which were made with holes to allow any accumulation of gas to get away. Some of the covers of the boxes were also made with holes, so as to ventilate them. Where these precautions were not taken, the casings of the pipes were blocked up, so that any escape of gas in one box was confined to it. They did not often find traces of gas in their boxes, and when the explosion occurred they opened every one of their boxes in Regent Street, and did not find any gas, though the boxes were nearer the gas-mains than those of the telephone people.

Cross-examined: The few traces of gas in his Company's boxes were generally found in those that were not ventilated.

Edwin J. Redgrave, a foreman, gave evidence as to the construction of the telephone boxes in Regent Street, and corroborated the statements made by Mr. Marvin.

In cross-examination, witness said it was not correct to assume that because there were these complaints in 1903-4, the Regent Street mains were always leaking. The mains were there before his time. He remembered recent complaints of gas in telephone boxes at Cromwell Road, Kensington, and Broad Sanctuary, Westminster, but had not heard of any other explosions.

Re-examined: Every joint in the mains that had been exposed was reset according to instructions.

* See "JOURNAL," Vol. LXVI., p. 982.

Charles Bashford, a foreman service layer in the employ of defendants, gave evidence as to the searches detailed by Mr. Marvin.

Mr. *Joseph Cash* said he had heard all the evidence in the case, and was of opinion that the defendants' men had done all they could to prevent danger. It was impossible to stop minute leaks of gas. The average loss by gas companies all over the country, from all sources, was 7¼ per cent., according to the latest returns; and this included unavoidable leakage. There was a tendency of late years for the percentage to increase, in consequence of the heavy traffic on wood paving, the great weights causing the wood and the concrete underneath to vibrate very considerably. Heavy traction engines, as used now, were especially injurious. The unavoidable leakage could not escape through the road, because the concrete and wood blocks were absolutely impervious; so the gas had to escape by way of the pavements. It would then collect in the boxes; and his view was that the explosion in the present case was brought about in this way. At Brighton, the leakage had increased by reason of the vibration caused by the tramways and the heavy motor traffic. He did not see that the Gas Company could have taken any other precautions than they did. It would be detrimental to public interests to keep on opening the roads to find small leaks.

In cross-examination by Mr. HARRIS, witness said he used the searcher and the indicator in the same way as defendants' men. He believed the leakage in Regent Street was brought about by the heavy traffic, which might cause the service-pipes to become loose at the point where they were connected with the mains. He could not possibly say what the average leakage was from the mains. He had never heard that it was possible to estimate the amount of gas which escaped. He knew of no other street in London which had four leaks in six or nine months, as he had no detailed knowledge of London streets. His experience in Brighton was that leaks were found in all roads at various times. He did not deny that accumulations of gas might exist in telephone boxes in other streets similar to Regent Street; but they were not heard of, because very few men were so silly as to apply a naked light where he had smelt gas before taking the trouble to ventilate the pipes. The life of a gas-main was dependent on the soil in which it was placed. He had some at Brighton which were as good as ever after 50 years, and which were laid in chalk. Those which were laid in ironstone only lasted 15 or 20 years. When once a joint was disturbed, the more vibration there was the larger the leak would become.

Mr. *G. F. L. Foulger*, the Company's Chief Distributing Engineer, said he visited the scene of the explosion, and was of opinion that the best tests possible had been applied. It was clearly to the Company's interest to prevent waste; and the men were continually reminded that it was to their advantage to see to it. Only a week or two ago, they gave a reward of £5. He agreed with what had been stated as to the effect on gas-mains of a concrete and wood road, and the vibration of heavy traffic. The Company were now trying to approach the Local Government Board, in conjunction with the Borough Councils, in regard to the increased heavy traffic in London streets. He had an interview with the Engineer of the London County Council to see whether it was possible to put any restriction on the traffic. The present limit of weight was 8 tons; but it had been proposed to increase it to 12 tons, to be allowed to travel at 12 miles an hour. The Company had upwards of 2000 miles of pipes, and whenever they had occasion to open the ground they reset the joints. The moment an escape was reported, men were sent off with the alacrity of a Fire Brigade.

Cross-examined by Mr. HARRIS: The Company sent to examine the mains with the searcher and indicator immediately they heard of the explosion, and they were found all right. To locate the place of the escape, it was necessary to open the ground. It would be right to apply a light to mend a cable if it were broken, and there were no smell of gas. He did not think the proper precautions were taken in this case. He agreed with the last witness as to how the escape was caused. There had been a similar escape opposite the Temple about a year ago, and there was an explosion, but no one was hurt. The small cracks which were found were quite normal.

This closed the evidence for the defence.

COUNSELS' SPEECHES.

Mr. DANCKWERTS asked the Jury, as sensible men of business, to come to the conclusion, from the proved facts, that there was no negligence on the part of the defendants. The only explanation was that there was something wrong with the Post Office boxes, their construction, their system of inspection and ventilation, or their method of handling them.

Mr. HARRIS, replying for the plaintiffs, said it was evident that there had been serious escapes in Regent Street before the one which caused the injury, and it was the duty of the defendants to search for, and deal with, them. It was evident that the Company did not believe the reports made by the Post Office as to escapes; and they were undoubtedly responsible for the damage done.

THE JUDGE'S SUMMING UP.

Justice DARLING, in addressing the Jury, said it was no doubt difficult to approach the consideration of the case with perfect fairness, as the plaintiffs had no doubt suffered injury from no fault of their own. It had been admitted that it was quite impossible to prevent the escape of a certain quantity of gas, and that the plaintiffs must prove that they were injured by gas which got out of the pipes owing to the negligence of the defendants. It was for the Jury to decide whether this negligence had been proved, though they would not have to decide the amount of damages, if any, as this had been agreed between the parties. But if the Jury found that there had been negligence, the defendants had a right to say that they must find that this negligence was the efficient and not the remote cause of the injury to the plaintiffs before they were liable—the efficient cause being the action of the Post Office servants.

THE VERDICT.

The Jury then retired. After deliberating for nearly an hour, they returned into Court, and gave a verdict for both plaintiffs.

Justice DARLING said it might be worth while for the authorities to consider whether these dangers could not be obviated by the same sort of ventilation being applied to telephone boxes as was used in electric light boxes. It seemed to him that the public were entitled to be protected against these dangers, if it was possible to do so.

The Jury agreed.

Mr. VAUGHAN WILLIAMS said Mr. Noble, of the Post Office, would convey his Lordship's remarks to the proper authorities.

Subsequently, a stay of execution was granted pending an appeal by the Company against the finding of the Jury.

PUMPING UNDERGROUND WATER IN NEW YORK.

Important Decision.

Owing in a large measure to the construction and operation of wells on Long Island, as part of the Brooklyn Water-Works, a great deal of litigation has arisen in regard to the right to develop underground water supplies for municipal purposes. Our contemporary, "Engineering Record" gives the following particulars of a recent decision on the subject.

The wells in question were sunk in a district mainly devoted to market gardening, and the actions for damages which have been instituted by property owners, on the plea that the wells injuriously dried their land, have had a marked influence on engineering enterprises. One of the most instructive of these suits is that brought by Mr. Frederick Reisert against the Municipality of New York, which has already been through all the Courts, and is now on its way upward for a second time. On the 20th of January last it was before the Appellate Division of the Supreme Court, where an opinion was given by Judge Hooker—the other learned Judges concurring—which is of much importance to designers of water-works in New York, and it has a certain interest for those whose operations are conducted on this side of the Atlantic. The plaintiff sued for damages and a permanent injunction restraining the operations of the defendants' pumps and driven wells near his farm. It was admitted on the trial that the draft upon these wells had lowered the natural level of the subterranean waters on his property; and it was conceded that the only question in the case was the extent to which the pumping-stations had affected the water, and any damage traceable thereto. The sixth finding at the trial was that the plaintiff had not suffered any damage, during the past ten years, either to the rental or the fee-value of his premises. The opinion of the Court and its rulings upon the trial make it clear that it adopted the measure of damages which has been determined to be the correct one governing cases of this kind. Applied to the facts in the presentation, the rule of damages, as laid down by the decision of the Court of Appeals, is to what extent the rental value of the lands, as affected by the diversion of the water, has been substantially injured. Judge Bartlett, for the Courts of Appeals in this case, has written these pertinent sentences:

> In regard to the position of the defendants in this and kindred cases, it appears that since the year 1884 the City has been fit to occupy the position of a naked trespasser, and sought to justify its action on the ground of paramount necessity arising from the requirements of a great city for an adequate supply of pure and wholesome water. If it is necessary, in the public interests, for the defendants to subject the inhabitants of Long Island to the damages incident to maintaining a large number of pumping-stations and driven wells, depriving extensive sections of the country of their underlying and percolating waters, as well as drying up the surface streams and wells, the least they can do is to meet the plaintiff in a spirit of fairness—eschewing technicality—and ascertain the actual damages in the premises, and, if not contented to pursue such a course, to institute condemnation proceedings. It is true that the right of the individual must yield to public necessity; but it should always be kept in mind that this result can be only fairly and legally accomplished by duly compensating the citizen for property damaged or destroyed.

The Court came to the conclusion that had the evidence and the findings in the case established beyond the possibility of dispute, under a rule laid down in a previous case, that the defendants were trespassers; and if the plaintiff had sustained any damage whatever, and was likely to sustain more in the future, by reason of the trespass, he was without doubt entitled to an injunction. If, on the trial of the questions at issue, adequate proof was offered tending to show what the extent of his injury had been within the six years prior to the commencement of the action, under the proper measure of damages, he was entitled to judgment for this amount. The sixth finding of fact—that the plaintiff had not suffered any damage to his premises—was deemed to have been insufficiently supported by the evidence; and it was concluded that the judgment must be reversed for this reason.

The pumping plant commenced operating about May, 1885, within a few feet of the plaintiff's premises. Prior to that time a clear spring ran on the western boundary of his land for a portion of its course, and for a distance flowed through one corner of his farm. Before the pumps began to operate, this stream was between 1 and 2 feet, and in some places 3 feet, deep. Holes 6 feet in depth existed. At the southern portion of the farm, the stream ran into and across his land; and at this point, before the commencement of the operation of the pumps, the plaintiff had established a game and fish preserve, where he owned both sides of the stream. It was used for watering produce, horses, and cattle, and for raising trout and watercress. It was unnecessary at that time for the plaintiff to pump water for domestic or farm use. He had raised trout in the stream, and had used them for himself and also sold them. The Court thought the conclusion was irresistible that, by reason of the maintenance and operation of the pumping-stations, this stream had practically dried up, and such water as was found in its bed was surface water; and though, immediately following rains, water flowed through the creek, it soon stopped, and what remained was stagnant. Prior to the trespass, the stream was permanent, did not dry up in summer, and seldom froze in the winter.

The plaintiff produced expert evidence tending to show that the fair rental value of his farm in the absence of the pumping-station was considerably greater than it was after the operation of the pumps. The defendants called a number of witnesses, some of them farmers—the burden of whose testimony was that the lowering of the water would

not have any effect upon the productiveness of the soil such as existed on Long Island in the vicinity of the plaintiff's premises, and that their rental value was not affected or diminished in consequence of the defendants' trespass. The plaintiff had occupied and worked the farm himself since 1883; and, in the absence of its having been rented, either during the continuance of the trespass or otherwise, proof of the rental or usable value was difficult to obtain.

The Court of Appeals held, upon the prior appeal in this case, that evidence of the character and extent of the use made of the lands and of the nature of the crops and business conducted there, together with evidence of the income, both gross and net, expenses, prices, fertilizer, manure, and help, when in their normal and usual condition as to subterranean waters, and also when deprived thereof, was competent, as tending to show usable value. The learned Judges said it was clear that, unless direct proof of the usable value was offered, based upon actual rentals, under conditions which would suggest that fair rent was being paid therefor, experts who might undertake to swear to the fair usable rental value could not give adequate answers, or give the Court valuable information to guide it in awarding damages, without taking into consideration all the conditions to which reference had been made, and which the Court of Appeals had said was competent on this question. It was clear from the record that the defendants' experts did not testify upon a consideration of such facts and circumstances; and especially was it true that not one of them was asked or appeared to consider the rental or usable value in the presence or absence of the natural stream at the westerly end of the plaintiff's farm. The conclusion was irresistible, from a consideration of the record, that the plaintiff had suffered damage other than the sole item of $90, the cost of driving his wells farther into the ground, which had been allowed.

Both parties asked the Appellate Court that, in the event of a reversal, final disposition should be made of the matter. The judgment of reversal should therefore contain a direction that an injunction should issue restraining the defendants from maintaining and operating their conduit lines and pumping-stations, and from diverting the surface and subterranean waters, but not to become operative if within a reasonable time (to be fixed by the judgment) they paid the plaintiff the value of the right to maintain and operate their conduit lines and power station as against the plaintiff—the amount to be appraised by commissioners duly appointed.

A Big Gas Escape at Oxford.

A story of a big gas escape was told at the Oxford County Court a few days ago, when the Oxford Gas Company claimed from Messrs. Coxeter and Sons £18 19s. 11d. for gas supplied and hire of meter and stove. For the plaintiffs, Mr. Walsh said the defendants, on taking certain premises, desired the removal of the existing 20-light meter and the substitution of a 10-light one; but the man who made the change was requested not to try the light. Two months later the register was taken, and a very large consumption was shown. This led to the discovery that in the ceiling a pendant had been removed, leaving a ¾-inch hole through which the gas had all the time been escaping. In addition, a burner was found turned on but not lighted. The man who fitted the meter said he had done with the matter when he had carried out this job; and the Manager (Mr. J. Eldridge) gave evidence that the man had no authority to undertake inside work. For the defence, it was contended that instructions had been given for the gas to be connected for brazing; and Mr. Coxeter thought the Company would see that it had been connected for that purpose only, as he asked them to cut it off from the lighting apparatus. Mr. Coxeter, in evidence, admitted that there was only one outlet-pipe from the meter; but he said that this afterwards branched off. His Honour (Sir T. W. Snagge) suggested a visit to the place, to see how far the outlet-pipe went into the premises before the lighting-pipe branched. This course was adopted; and it was found that the outlet-pipe went up for about a foot, and then branched into three—one for the light, one for the brazing, and one for a stove. His Honour said it seemed to him that Mr. Coxeter was perhaps a little imaginative when he said he was under the impression that he was giving directions to the Company to cut off everything connected with lighting. It was a misunderstanding; and he asked whether the Company would be willing to meet the defendant. Mr. Walsh said they had always been ready to do this. They only wished to establish the principle that there was no obligation on them in cases of this kind. His Honour said there would be a formal order of judgment for the plaintiffs, with such costs as they might both agree upon.

Aberystwyth Gas-Works to be Purchased.—At a special meeting, the Aberystwyth Town Council have resolved to purchase the undertaking of the Gas Company. The Town Clerk explained that in the Company's Act of 1898 the Corporation obtained power to acquire the undertaking at any time within a period of thirty years. The Company had now applied to the Board of Trade for additional powers; and objection was at once taken by the Council on the ground that the standard price of gas was too high, and that the additional borrowing powers sought were excessive. He added that if these money powers were granted it would practically prevent the town acquiring the works, and that efforts to arrive at an amicable arrangement had been futile.

Lewes Gas Company.—The report which was submitted to the half-yearly meeting of the Lewes Gas Company last week stated that the revenue account for the six months to Dec. 31 showed a profit of £1486. The Chairman (Mr. C. R. Kemp, J.P.) said it must be satisfactory to the shareholders that the Directors were able to recommend the usual dividends of 5 per cent. on the original capital stock and 3½ per cent. on the additional capital stock, though there had been a reduction of 2d. per 1000 cubic feet in the price of gas. To do this, they had to draw a trifling amount from the reserve. The report was adopted; an increase in salary was voted to the Secretary (Mr. H. J. Hillman); and the Chairman was thanked for his services. The latter gentleman, in responding, paid a warm tribute to the Manager (Mr. Levi Monk), and the staff under him.

MISCELLANEOUS NEWS.

SHEFFIELD UNITED GASLIGHT COMPANY.

The Half-Yearly Meeting of this Company was held at the Cutlers' Hall, Sheffield, on Monday of last week. In the absence of Sir Frederick Mappin, M.P., through slight indisposition, the chair was taken by Mr. WILSON MAPPIN.

The GENERAL MANAGER and SECRETARY (Mr. Hanbury Thomas) read the notice convening the meeting.

The CHAIRMAN, in moving the adoption of the report and accounts (which were noticed in the "JOURNAL" for the 21st ult., p. 510), said he was sure they would all regret the absence of Sir Frederick Mappin. Turning to the accounts, he remarked that, after paying the usual dividend, which amounted to £43,424, there was a surplus profit on the past half year of £9884, which, added to the previous unappropriated balances, made a total of £70,050 in hand. The reserve fund was full, and amounted to £86,848. This result was after reducing the price of gas 2d. per 1000 cubic feet, from Jan. 1, 1904. A further reduction had had the consideration of the Board, who had decided to reduce the price, after taking the meter indices at the end of this month, to 1s. 6d., 1s. 4d,, and 1s. 2d. per 1000 cubic feet, which would be the lowest price charged for gas in England. It was worth mentioning that on Oct. 1, 1901, the price was reduced from 2s 2d. to 2s. per 1000 cubic feet; on March 31, 1903, from 2s. to 1s. 10d.; on Jan. 1, 1904, from 1s. 10d. to 1s. 8d.; and on March 31, 1905, from 1s. 8d. to 1s. 6d.—making a total reduction of 8d. per 1000 cubic feet, or 30·77 per cent. in the four years. There had been 1188 tests made of the gas during the half year under review. These showed an average illuminating power of 17·38 candles; the parliamentary standard being 16½ candles. Coals had cost less by £4586; and the Company had received £10,948 less for gas, owing to the reduction in price. They had also received £2362 less for coke, £2688 less for sulphate of ammonia, and the profit on the fitting department was £584 less. The quantity of gas sold in the six months was 1,409,125,000 cubic feet, and for the corresponding period of 1903 1,401,515,000 cubic feet; being an increase of about 8,000,000 cubic feet. The leakage during the same period was 4·10 per cent., against 3·78 per cent. in the same half of 1903. The number of additional meters fixed during the past twelve months had been 2865, while the total number fixed on Dec. 31 was 77,681. Of gas-fires, 1299 were sold last year; and during the same period 1248 boiling and other stoves were disposed of, 411 cookers were let on hire, and 43 gas-engines were fixed. The consumption of gas in 1884 was 1258 million cubic feet; in 1894, 1819 million feet; and in 1904, 2745 million feet—showing that the annual sale of gas at the end of the twenty years had increased by 118 per cent. During the ten years ended December, 1904, the Company fixed 9384 additional meters; and for the ten years ending December, 1904, 26,738 additional meters were fixed—thus showing that the business during the latter period increased at a greater rate than previously. During the last three years the additional meters fixed had been as follows: 1902, 3442; 1903, 3423; and 1904, 2856. With gas at 1s. 2d. per 1000 cubic feet (which would, after the 31st inst., be the price charged for gas-engines), and allowing 22 cubic feet per hour, which was the maximum required per horse power, 3¼-horse power per hour could be obtained for 1d. The new gasholder at Neepsend was progressing satisfactorily; and the contractors hoped to hand it over to the Company ready for use on Aug. 31 next. Its capacity would be 7,706,770 cubic feet; and the contracts for the tank and holder together amounted to £51,015.

Mr. T. H. WATERHOUSE seconded, and the motion was carried.

The CHAIRMAN moved that a dividend be declared for the half year of 5 per cent. on the "A," "B," and "C" stock.

Mr. H. K. STEPHENSON seconded, and said they would agree that the statistics given them were a very satisfactory record, and that, coupled with the reduction in the price of gas, they represented a happy state of things.

The resolution was carried.

Mr. E. ROWBOTHAM moved, and Mr. J. W. SISSONS seconded, a vote of thanks to the Chairman.

The CHAIRMAN, in responding, said he took it that the vote included the officials, and he thanked them very much. He was glad to have laid before them so good a report; and he saw no reason to doubt that the prosperity of the Company would continue in the future as it had hitherto done.

ILFORD GAS COMPANY.

In presiding over the half-yearly meeting of the Ilford Gas Company recently, Mr. William Ashmole congratulated the proprietors upon the result of the working during the six months. The profit amounted to £6758, compared with £7144 in the corresponding half of the previous year; but it had to be borne in mind that there had been a reduction of 2d. per 1000 cubic feet as from the beginning of 1904. The saving to the consumers during the half year by the reduction was £1023. This large sum had been more than covered by increased business and economies effected in manufacture; but there had been a falling-off in the receipts from coke and tar which had materially affected the profits. For coke £547 less had been received, and for tar £206 less; but, with better trade generally, it was hoped that a recovery would soon take place. The rate of expansion of the business had been very satisfactory; and by further reducing the price of gas from 3s. 4d. to 3s. 2d. per 1000 cubic feet from the beginning of the current year, the Directors hoped not only to consolidate the business already obtained, but also to gain new consumers in increasing numbers. The quantity of gas sold during the half year was 122,882,000 cubic feet, or 8,759,000 feet in excess of the corresponding period of the previous year, thus bringing the total increase for the year to 30,073,000

feet, or 14·1 per cent. A gratifying feature of the accounts was that, notwithstanding the increased production, the cost of manufacture showed a reduction of £507. For such a result, great credit was, of course, due to their Engineer and Manager (Mr. A. A. Johnston); the working comparing favourably with that of other Suburban Companies. Referring to the recent litigation in respect of the flood of 1903, the Chairman said that since the printing of the report further developments had taken place which were favourable to the Company. Two actions involving heavy claims (one amounting to £3170 and the other to £1944) had been withdrawn by the plaintiffs, who had undertaken not to bring actions again on these claims. A freehold site had been purchased in the High Street for the erection of a new show-room and offices; and a further issue of stock would shortly be made.

The report and accounts were adopted; the usual dividends at the rate of 6 per cent. per annum on the "A" and "C" stocks and 4½ per cent. per annum on the "B" stock (less income-tax) were declared; and a further sum of £517 was added to the reserve fund. Votes of thanks to the Directors, officers, and staff concluded the proceedings.

WREXHAM GAS COMPANY.

The first thing that the Chairman of the Wrexham Gas Company (Mr. J. O. Bury) did at the recent annual meeting was to congratulate the shareholders on the increased prosperity of the undertaking. He pointed out that there had been a small decrease in the receipts for gas sold to ordinary consumers, which was accounted for by the reduction of 3d. per 1000 cubic feet made in December, 1903. There was, however, an increase of no less than £726 in the receipts from prepayment consumers; the total sum derived during the year from this source having been £4380. This increase was due to the Board having, since the early part of last year, let prepayment consumers have cookers free of charge. At the present time there were 2600 prepayment meters in use, and 1200 cookers. In the sale of residuals there was a slight falling off. The expenditure on coal was less by £218 than in the preceding year, notwithstanding an increase of nearly 9 per cent. in the make of gas; and this gratifying result was due to improvements in manufacture initiated by their excellent Manager (Mr. J. Braithwaite). In order to be prepared for next winter's supply, the Company had entered into a contract with Messrs. C. & W. Walker for the erection of a 500,000 cubic feet gasholder. This holder, which was rapidly approaching completion, was designed by the Manager, to whom very great credit was due for the care taken by him in providing a thoroughly safe foundation, and a holder of undoubted stability. The work to be done in the immediate future included the provision of a coal-breaker, a short elevator and conveyer, and two loading-hoppers, as well as considerable repairs in one of the retort-houses. Referring again to Mr. Braithwaite, he said his devotion to duty was beyond all praise; and the Company owed him a deep debt of gratitude for having so successfully pulled them through the past winter, notwithstanding the shortage of storage accommodation, and for the abolition of naphthalene, which had effected a great saving.

The report was adopted; and dividends for the past year at the rates of 10 and 7 per cent. were declared.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Mr. Stephenson Robert Clarke (in the absence of the Chairman, Colonel James Le Geyt Daniell) presiding.

The Secretary (Mr. Thomas Guyatt) read the notice convening the meeting; and the Directors' report and the statement of accounts were taken as read.

The Chairman said he must first express to the shareholders the regrets of their excellent Chairman on his unavoidable absence that day—regrets that he (Mr. Stephenson Clarke) knew would be reciprocated by all present. Colonel Le Geyt Daniell's absence, they would be sorry to learn, was caused by his state of health having necessitated a trip to a better climate during the cold spring weather. As to the results of the working of the Company during the past half year, they appeared to the Directors to have been very satisfactory. The decrease in the rental was solely owing to the reduction in the price of gas. An increase in private consumers—numbering 366 in the year—and also in public lamps (which now numbered 2174 against 2057 during the same period of last year), and the great activity of the fitting department, made the Board very hopeful that they would soon be back at the old figure. They had been able to effect some economies in working which enabled them to show practically the same profit as last year; and perhaps in this connection the following figures might interest the shareholders. They had saved 1s. 3d. per ton on coal. The coal had yielded 10,402 cubic feet of gas per ton, against 10,530 cubic feet last year; and the fact that they had carbonized 500 tons more had enabled them to make an increased profit of £166 on their residual products. The total quantity of gas accounted for was 50,950,000 cubic feet, against 48,007,000 cubic feet in the second half of 1903. The fittings showed an increased profit of £180. As the shareholders were promised last year, the item of "Exchange" had disappeared; and they had saved £630 under this head as compared with the corresponding six months. There were, on the other hand, certain increases, due to the additional business, under salaries, lamplighting, &c.; and the expenditure on depreciation, renewals, and repairs to provide for the necessities of the Company amounted to £3943, against £4208 spent during the latter half of 1903. In conclusion, he could only say the prospects of the present half year were again very good; and, in confirmation of this, he would like to read an extract from a letter, dated January 19, from their Engineer and Manager (Mr. John Gandon). He wrote: "Prospects are favourable for the present year; and I think it is quite reasonable to expect such an increase of profit as will entirely wipe out the loss of revenue caused by the large reduction in the price of gas—in fact, a further reduction might be considered." He (the Chairman) begged to move the adoption of the report and accounts, together with the declaration of a dividend for the half year at the rate of 7 per cent. per annum on both classes of shares.

Mr. H. W. Andrews seconded the motion, which was unanimously carried.

Mr. Andrews next proposed the re-election of the retiring Directors (Mr. Stephenson R. Clarke and Mr. Strachan C. Clarke).

Mr. A. M. Paddon, in seconding, said the progress of the Company, which had been a considerable one, actually and comparatively had always been associated with the names of these gentlemen. The connection of the family went back a long way over an unbroken record of success. The presence of these gentlemen on the Board was valuable, owing to their special form of knowledge, which reflected inevitably on the profits as each half year went by.

The proposition was unanimously agreed to, and response was made by the Chairman.

Moved by Mr. W. Hughes, and seconded by Mr. T. Wilkins, the Auditors (Mr. T. H. Cooke and Mr. A. W. Cooper) were reappointed.

Mr. A. F. Phillips proposed a vote of thanks to the Chairman and Directors for the attention they had given to the business during the past half year. He said he thought the revenue account was an exceedingly satisfactory one, bearing in mind the reduction that had been made in the price of gas, and the amount that the Directors still continued to spend in repairs and depreciation. This was really the secret of the success of the Company, that the Directors thoroughly maintained the works, and were liberal in the expenditure from revenue for this purpose.

Mr. T. P. Fisher seconded the motion, which was unanimously carried.

The Chairman expressed the gratitude of the Board for the shareholders' kind expression of confidence. He remarked that they had perhaps had an easy time during the past year, because they had had freight exceptionally cheap to the East; and they hoped this would continue during the current twelve months. He trusted that they would meet the shareholders again in six months' time with quite as good a balance-sheet as they had on this occasion. He then moved a vote of thanks to the officers; remarking that, in Mr. Gandon and Mr. Guyatt, they had two most zealous and excellent officials. They all knew it was not so easy to work a company by correspondence, as it was when the officers could meet daily and frequently exchange views. He could not bear too high testimony to the ability and tact of these two gentlemen.

Mr. Paddon seconded the motion, observing that, having been himself an officer once, he knew that nothing was more highly appreciated by their officials than these references to their services. Their difficulties abroad were very great, and differed from those at home; but there was this to be said, that one would look, in the circumstances under which the Company's affairs were operated abroad, for some little disparity in the resulis—they would not expect men to do as well in semi-tropical places as they did at home. When, however, they looked at the carbonizing returns or any of the other results out in Smyrna, it was seen that they came out better than in the case of many companies at home—much larger, in fact, than anything shown by some other companies, which it would be invidious to mention under the circumstances.

Mr. A. W. Oke thought that one of the most satisfactory things about the accounts this half year was that, although there had been a reduction in the price of the gas, it was practically made up by the increased sale. This showed that, not only were the Directors working well here, but the officers locally were doing their best in the interests of the Company.

Mr. C. B. O. Clarke added a few words of appreciation of the services of both Mr. Guyatt and Mr. Gandon.

Mr. Guyatt having responded on behalf of himself and Mr. Gandon, the proceedings terminated.

SCHOOL LIGHTING IN SOUTH LONDON.

The London County Council and the South Suburban Company's Gas

The Secretary of the South Suburban Gas Company (Mr. Charles M. Ohren) has addressed to the Clerk of the London County Council (Mr. G. L. Gomme) a letter on the subject of the observations he made in a communication to the Penge Urban District Council and other Local Authorities on the illuminating power of the gas supplied by the Company to certain schools in their district, on which some comments appeared in the "Journal" for the 7th inst. (p. 628). Mr. Ohren calls the Clerk's attention to these comments, and then proceeds—

"The first observation I am instructed by my Directors to make is that if the Council is dissatisfied with the supply of gas to its schools, it would have been courteous and straightforward to have communicated direct to the Company. They do not see how the question concerns the Urban District Council of Penge and the other Local Authorities to whom the statement has been sent; and they feel that, whether intended or not, it is calculated to prejudice the Company in the minds of the members and of the public who may read the reports of the meeting at which your statement was read. My Directors cannot but regard this action as unfair, and unworthy of a body holding the great position of the London County Council.

"Moreover, the tests were absolutely wrong. The Company never sends out, and, in fact, cannot make, coal gas (and nothing but coal gas is now made) of so low an illuminating power as 12¼ candles. The gas was made entirely from Newcastle coal, was not enriched in any way, and was slightly below 15 candles. Such gas loses very little in its passage through the mains to the premises of the consumers, as the Council's officers know from experience of similar gas supplied by the South Metropolitan Company. The low tests of 12·43 and 12·01 candles

were entirely due to the inaccurate method of testing with the portable photometer. The Council should remember that they made a determined attempt in 1900 to get Parliament to legalize the use of the portable photometer. They had a full hearing, with able Counsel and many witnesses, before an exceptionally strong Committee, presided over by Mr. Oldroyd. The Gas Companies proved that gas could not be fairly tested in that way; and the Parliamentary Committee decided that testing gas with the portable photometer in schoolrooms and other places was unreliable and unfair to the gas, and refused the application of the Council. The Council again endeavoured to get an opinion favourable to the portable photometer from the Board of Trade Departmental Committee of experts last year, and again failed.

"Under these circumstances, my Directors submit that it was not fair, on the part of whoever was responsible for this action of the London County Council, to give to the District Council of Penge and to the other Local Authorities figures purporting to be true that were obtained by a method that had been proved to be unreliable. To still further prejudice the Company, the Council's officer added quite gratuitously the statement that if the gas had been tested in another way it 'would have been about 10·5 candles.' This is a guess, as experiments show that by this method of testing a much lower result would be obtained from 12-candle gas, and should not have been given; for the Departmental Committee of the Board of Trade recognized that this method of testing would not give the gas its true illuminating power."

A copy of this letter has been sent to each member of the London County Council and to the Clerks of the Local Authorities in the Company's district.

LEICESTER GAS AND WATER SUPPLY.

The Past Year's Working—Result of Naphthalene Treatment.

A Special Meeting of the Leicester Town Council was held last Tuesday—the MAYOR (Mr. S. Hilton) in the chair—at which the municipal budget was under consideration. This subject, however, was preceded by the presentation of reports from the Gas and Electric Lighting Committee and the Water Committee, showing the position of the undertakings under their control at the close of last year.

Mr. EDWARDS, in moving the adoption of the part of the first-named Committee's report which dealt with the half-year's gas, said the total amount borrowed was £1,164,959, of which £77,653 had been cancelled or repaid, and the capital outstanding was £1,087,306. The revenue account showed that coals cost £47,434, or a decrease of £3704 compared with 1903; salaries of engineer, superintendents, and officers at works were £1223, or £33 more; carbonization wages £12,242, a decrease of £268; repairs and maintenance of works, plant, &c., £8804, a decrease of £1973; expenses connected with engines and, boilers, £1135, a decrease of £75. The total expenditure on the manufacture of gas was £72,423; being £6755 less than before. In the distribution of gas they had spent £13,483; being a decrease of £3259. Rates and taxes came to £10,662—an increase of £1630, due to the larger amount of the income-tax. In management they had spent £3264, or £156 more. By bad debts and discounts, they lost £170—a decrease of £52. The total expenditure was £100,005. By the sale of gas they realized £113,281, a decrease of £411; and from coal, coke, and breeze £20,765, or a drop of £2532. For tar and ammoniacal liquor, they received £16,667—a decrease of £1573. Two other smaller items brought the total income to £152,966. Deducting the expenditure, they had a profit of £52,961; being an increase of £3633. To this sum they had three smaller items to add, making the total £53,621. This they disposed of by paying £19,398 in interest and adding £7220 to the sinking fund, which left them with a clear net profit of £27,003. Adding this to the profit of £22,005 for the first half of the year, they had a total of £49,008. Turning to the general balance-sheet, in which their affairs were clearly set out, it was shown that they had a reserve of £6000. He was sure the Council and the town would be gratified at the success of the gas undertaking during the past year. It would be well for them to endeavour to see where the profits came from. They were told in the newspapers that they came from the increased prices the Committee obtained from residuals in the first half of the year. It would be well, if the Press desired to give facts to the town, that they should verify them before they gave them. He found, on looking through the accounts, that in the first half of the year they received £3267 more from residuals than in the first half of the preceding year, and that they lost on this account during the second half of the year £4105. This meant that the decrease on residuals really was £838; so that they got none of their profits from the residuals. Their profits had been obtained by splendid management, by the loyal staff, and by excellent workmanship; and the whole of the employees—staff. manager, and workmen—deserved the congratulation of the Council, It was true they had cheaper coal during the year—the cost being £3704 less than in the preceding year; but they lost on the residuals, and had a decreased consumption of gas amounting to £411. It was something unusual for the Gas Department to have a lower consumption. There were two causes for this. The first was the depressed state of trade in the town. During depression, factories were closed at dark, and the gas was not used; while the workmen, who received lower wages, economized on their gas bills as well as in other ways. The second cause was the popularity of the incandescent burner, which had come to stay. The great contributory influence in their profit was Mr. Colson's naphthalene cure. He (Mr. Edwards) stated six months ago that it was quite possible this would save £5000. This was a modest estimate—far too modest; and he had no hesitation in saying that the large proportion of the profit had been obtained through Mr. Colson's patent. They spent during the preceding year something like £2000 in opening up the streets to get at the obstructions that were caused by the deposits of naphthalene. They employed about 100 workpeople, whose business was to run about the town relieving the obstructions caused in this way. They found by the removal of this difficulty that the temperature in their retorts could be so increased that they obtained much higher results from the coal than they did previously. They got a larger quantity of gas per ton of coal than they did twelve months ago. He found that in 1904 they made 11,390,000 feet of coal gas more than the previous year. It was true the consumption was less; but the explanation was that they did not make any water gas last year. They made rather more than 11 million cubic feet of gas more than in the previous year, and yet there was a decrease of £268 in wages, while 165 tons of coal less were carbonized. This meant that they would probably save in the coming year something like 15,000 tons of coal for the same quantity of gas hitherto made. The Council ought to be very thankful they had such a man as Mr. Colson in their service. He was responsible mainly for the increased profit, with which the Council must be so well satisfied. With regard to the future, he would remind them that they had a decreased consumption; while residuals were at the present time a drug on the market, and almost unsaleable. If these circumstances continued, they could not hold out any hope of having such a balance-sheet twelve months hence as they had now. Their estimate of profit for the coming year was £30,000; and he hoped that they would reach this figure; but the Council must not be disappointed if they did not do so. He had hoped the profits for the past year would have reached the round sum of £50,000; and he believed this would be accomplished in the future, though not in the coming year.

Mr. JENNINGS, in seconding the motion, said that some two months ago, in introducing the gift of Mr. Colson to the Council, he stated that this would be a record year; but he did not anticipate at that time that the profits would be so large as was reported. He had given some time to the consideration of the naphthalene question, and he entirely agreed with Mr. Edwards that a great deal of the profit made had been due to Mr. Colson's invention. In regard to the decreased consumption of gas, there was no doubt the people of Leicester were beginning to see the usefulness of, and the saving effected by, incandescent burners.

Mr. BRUCE said it was unfair, to his mind, that the gas consumers should be charged what they were at the present time. On the average, they had to pay 2s. 4d. per 1000 cubic feet; and a considerable portion of this sum was returned in the shape of profits to the electric light consumers. He did not advocate that the price of the electric light should be raised. They were going to spend something like £13,000 on new electric lighting plant, not for the general body of the ratepayers, but simply for the benefit of the electric light users. For the last fifteen years these consumers had not paid a single penny towards the rates of the town. If they were going to spend £13,000 in this way, surely they might reduce the price of gas by 2d. per 1000 cubic feet. This would come to £7640; and, to his mind, the Committee ought to do as he suggested. They should also consider the advisability of reducing the cost to the slot-meter users.

Mr. BANTON said they all joined in the congratulation to the Chairman of the Committee. He would like to join also with the last speaker in asking the Chairman and the Engineer to give the poorer gas consumers a little consideration. The people who used penny-in-the-slot meters, and paid their rent and rates weekly, derived no benefit from the profits made by the Committee. He thought, considering that the Committee made great profit from those who used these meters, they ought to reduce the amount paid by the poorer people.

Alderman SMITH hoped the Chairman of the Committee would not consider for a moment any differentiation between the different classes in the town. As a matter of fact, the users of slot meters had a very considerable advantage at the present time; indeed, they were much better off than the ordinary consumers. In his judgment, he thought it was right, as this was a municipal concern, that all the ratepayers should be on the same footing.

Mr. BANTON asked if it was a fact that the Committee sold gas to the users of gas-engines at a cheaper rate than those who employed it for lighting. If so, there was differentiation.

Mr. J. T. HINCKS said he observed in the accounts the words, "Gas supplied at 3s.; gas supplied at 2s. 8d.; and gas supplied at 2s. 4d.," &c. There was a vast difference there. He wondered why the poor men who used gas in their offices should not get a share, at all events, of the reduction.

Mr. EDWARDS, answering Mr. Hincks, said the reason for the difference was to be found in the distance that they had to take the gas; so that, though they charged more, they did not get a higher price for their gas. Mr. Bruce had fallen into the error he dropped into a year ago, when he advocated the abolition of the rent charged for cooking-stoves. Mr. Bruce was only taking the six months' balance-sheet. To reduce the price of gas by 2d., as he had suggested, would cost £15,000; and if they lowered the price of gas, and came to the Council with £15,000 less profit, they would get little credit for having done so. As for the users of slot meters, they actually had cheaper gas than those who used ordinary meters. He would like to point out that though the prepayment consumer paid 5d. per 1000 cubic feet more than the ordinary consumer, he paid nothing for meter-fittings and no rent for his cooking-stove, which averaged 1s. per quarter. There were 27,000 users of slot meters, and the number was steadily increasing; while the number of consumers using ordinary meters was growing smaller month by month. The reason was that they found the slot meters cheaper. They were charging less to the slot-meter user than was the case in other towns, where the difference between the two kinds of meter was generally 9d. per 1000 cubic feet. With regard to the lower price charged for gas for engines, the Committee found it profitable to make this difference. It meant a day-load, and by this means the staff could work in the daytime, and thus help to make larger profit. Again, they had competition in the matter of gas-engines, but none in gas for lighting.

The report was adopted.

Alderman COLEMAN moved the adoption of the report of the Water Committee. In doing so, he said that after the report to which the Council had just given consideration theirs was a very commonplace affair. However, they were able to record a steady growth of income year by year; and last year it was about £2000. He added that the

weather of the preceding fortnight had been a great relief to the Committee.

Alderman WINDLEY seconded the motion.

Mr. HINCKS asked what was the total amount they had saved in regard to the Derwent Valley water undertaking. He noticed that they had just paid £16,502, which was going for the benefit of posterity instead of relieving the rates.

Alderman COLEMAN said the amount already paid was about £69,000, and the sum Mr. Hincks had mentioned would make it up to about £85,000.

The report was adopted.

THE HALIFAX GAS UNDERTAKING.

Appropriating the Profits.

Last Wednesday, when the Halifax Corporation laid a rate of 7s. 6d. in the pound, some interesting facts were forthcoming in relation to the gas undertaking. Alderman G. H. Smith, reviewing the estimates, said that a very erroneous impression had got abroad that in the gas-works they had a "white elephant," and a continual loss. He wanted this idea to be dissipated. They had a valuable plant; and the works, he was sure, would prove a very profitable concern for the benefit of the town for many years to come. People outside forgot that they were continually reducing the capital of the undertaking. There had been £136,722 paid off the original cost, which was £669,201. During the past year, the works had paid in rates £6153; they had kept up their plant out of income by spending £13,310; and they had paid in interest £18,272, and to the sinking fund £7197. Yet they made a substantial profit. The profit for the coming year was estimated at £9227; and the Finance Committee were taking from them this sum, leaving them £13,000 as a reserve fund in case of any emergency or speeal difficulty. The Council might, perhaps, criticize the wisdom of taking the whole amount, but his figures could not be altered. Mr. Collinson remarked that probably the Gas Committee would have to make alterations involving large expense; and next year they would either have to come with a big debit balance or increase the price of gas.

Alderman Wadsworth, the Chairman of the Gas Committee, said that Alderman Smith had been able to face the music by milking the Gas Committee dry. The undertaking had come to the rescue, and not for the first time; but it had never come with such unwillingness. Under their Bill of 1902, the Gas Committee could put aside 1 per cent. until they had reached £50,000. According to a resolution of the Council in September, 1904, the £13,000 odd was put aside as a reserve fund, and £6500 was to be added from the profits. He had hoped before 1905 finished that they would have £20,000 in hand. But the Finance Committee came along and took every penny piece—as far as the Committee knew, at any rate. Mr. Skinner said the Chairman of the Finance Committee had cut down the Gas Committee to the utmost limit; and how they were going to pay their way he could not tell. He considered the policy of taking away £9000 from the Gas Committee an unwise one. In the tar works they had a "white elephant;" and the Committee were having to provide £3000 a year for them.

The new rate was agreed to, after over two hours' discussion.

THE CHARGE FOR WATER IN THE CITY.

Complaints against the Water Board.

At the Meeting of the Court of Common Council last Thursday—the LORD MAYOR presiding—the subject of the charge made for water by the Metropolitan Water Board was under consideration.

Mr. T. V. BOWATER moved—"That it be referred to the County Purposes Committee to consider the desirability of making representations to the Government, or taking such other steps as may be expedient, in reference to the present heavy charges levied upon consumers of water used for household purposes in the City of London, and the prospective increases therein consequent upon the quinquennial revision of rateable values." He said the question was of so important a character, affecting as it did the interests not only of the citizens but of the inhabitants of Greater London, that he hoped the Court would be unanimous upon it. It was a great hardship to those having premises within the City to be called upon to pay for water at a rate which made it absolutely dearer than wine. It would, indeed, in some instances be cheaper to use champagne. The time had arrived, he thought, for the Corporation to make a strong representation to the Government on the question. Why should not water be paid for in a manner similar to gas and the electric light? If this was possible, the citizens would not find themselves in their present position. The demands now made were simply preposterous, as when a man's rent was increased a further demand was made for water never used.

Mr. MILLAR WILKINSON seconded the motion.

Mr. MORTON reminded the Court that the question was an old one, and had been frequently debated. It was generally realized that the citizens were paying between £60,000 and £70,000 a year for water they did not use. In 1884, the Corporation went to Parliament with a Meter Bill; but the measure was not successful. Three years ago, when the Water Bill was before Parliament, the Corporation endeavoured to get a clause inserted for the protection of the citizens; but nothing appeared to have been done. Under the regulations of the Metropolitan Water Board, the rates were now responsible, and not the consumers; and it seemed to him that the Board were worse than the Water Companies were. The former now made people pay in advance, while the latter never troubled much so long as the money was paid at the end of the six months. The Board intended to get all they could out of the ratepayers; and they were carrying out their regulations in a much more stringent manner than the Water Companies did. The people had purchased the River Thames in order to obtain a good water supply; but it appeared to him that there was every prospect of their having to find the money for the purchase of a new and pure supply. He wondered whether the citizens of the richest city in the world would be content to drink Thames and Lea "sewage" for ever. Why, he asked, could not water be obtained at a fair price, instead of people being compelled to pay for what they never used. The present condition of things was monstrous, and, although it might be legal, it was nevertheless a plundering of the ratepayers.

Mr. ASHBY said Mr. Morton, who was a member of the Thames Conservancy, had no right to describe the water supply as Thames sewage, seeing that it was analyzed regularly by some of the ablest experts, who proved it to be a pure drinking water.

Mr. WHITE declared that the New River Company never charged the full rates to which they were entitled in the City; but he had heard that the Water Board were going to take a different course, and increase the rates.

The proposition was unanimously adopted.

WATER SUPPLY TO TENEMENT HOUSES.

At the Meeting of the London County Council last Tuesday, the Public Health Committee presented a report on the above subject. They pointed out that in the report of the Parliamentary Committee considered by the Council on Dec. 6, 1904, the Committee suggested that the Council should ask the Metropolitan Water Board whether they would acquiesce in, or obtain the removal of, the existing restrictions in their Acts of Parliament with regard to the height of the supply of water. The Council decided to communicate the purport of the report to the Board. As the Public Health Committee originally brought before the Council the question of the adequacy of the supply of water to tenement houses, the Parliamentary Committee forwarded to them a copy of the reply of the Board, in which they stated that, without prejudice to their statutory rights, they would be glad to co-operate as far as possible in the direction desired by the Council, and would be prepared to accept in tenement houses similar arrangements to those adopted in the case of blocks of houses constructed by the Council. The Board added that it was, of course, understood that proper arrangements wou'd be made to prevent the lower floors taking away the pressure from the higher floors during the busy times of the day; and, further, that they would not contribute in any way towards the cost of providing the necessary pipes and fittings in the houses. The Board further stated that it was desirable that their Chief Engineer should be communicated with in each case before arrangements for an improved supply were commenced, so that there might be no misapprehension as to the height at which the supply could be afforded. The Committee informed the Council last January that, as the result of proceedings by the Woolwich Metropolitan Borough Council respecting the water supply of a tenement house in High Street, Woolwich, the Magistrate had decided that the supply of water from a tap in the yard was not a proper and sufficient supply within the meaning of section 48 of the Public Health (London) Act, 1891, and that he had made an order to abate the nuisance, and ordered the defendant to pay £5 5s. costs. The Council decided to communicate the facts of the case to the various Metropolitan Borough Councils, with an expression of the hope that they would take all possible steps to secure the provision of a proper and sufficient supply of water for the tenants of every floor of a tenement house; and the Committee thought the Council should now communicate to these Councils the information contained in the letter from the Water Board. They recommended accordingly; and this was agreed to.

METROPOLITAN WATER BOARD.

The Fortnightly Meeting of the Board was held on Friday—Sir R. M. BEACHCROFT in the chair.

Mr. GLASS (the Vice-Chairman) asked Mr. E. B. Barnard, the Chairman of the Works and Stores Committee, whether his attention had been directed to the statements alleged to have been made on Tuesday last by the Chairman of the Fire Brigade Committee of the London County Council on the subject of the inadequate supply of water at a fire in Church Road, Battersea, on the 20th of February, and whether he could explain the precise facts to the Board.

Mr. BARNARD, in reply, gave particulars of the matter, and said that, with regard to the fire, the suggestion that the Board were in fault was altogether inaccurate. A conference was proceeding between himself and the Chairman of the Fire Brigade Committee; and he considered that the statements which had been made would have been better reserved until that conference had been concluded.

The CHAIRMAN said he would not like it to go forth that there was any misunderstanding between the Council and the Board.

In reply to a question as to some remarks made at the meeting of the Court of Common Council of the City of London on the preceding day, as reported above, to the effect that the Board were proposing to rate the City up to the highest possible point, the Chairman of the Appeal and Assessment Committee informed the inquirer that there was no foundation for the statement.

The Works and Stores Committee presented a report on the subject of the new regulations made by the Local Government Board, under the Motor Car Act, 1903, in regard to heavy motors and traction-engines. By these regulations, the weight of an unladen motor car is increased from the present maximum of 3 tons to 5 tons; while with a "trailer" the combined maximum weight unladen is increased from 4 to 6½ tons. The maximum laden weight of a car is fixed at 12 tons, with a maximum single-axle weight of 8 tons. In a report upon the subject which the Committee had received from the Chief Engineer (Mr. W. B. Bryan), he called attention to the fact that the regulations, which came into force on March 1, 1905, did not limit the weight which might be placed on a "trailer" drawn by a heavy motor car.

This, in his opinion, would constitute a serious danger to the Board's mains and pipes, inasmuch as the weight placed on a "trailer" was only limited by the power of the motor car drawing it; and as the regulations contemplated the motor car of the maximum weight (loaded) of 12 tons, it might be anticipated that the possible weight of a loaded "trailer" would be very considerable. The Chief Engineer stated that damage had frequently occurred to water-mains by reason of the passage over them of traction-engines, themselves probably not weighing more than from 5 to 6 tons, drawing great loads, such as steam-boilers, which had exceeded 20 tons in weight. The Committee explained that heavy locomotives, known as traction-engines, are distinct from heavy motor cars, and are unaffected by the new regulations, being governed by a distinct set of statutes permitting the use in streets of locomotives propelled by steam and other mechanical power provided they do not exceed 14 tons in weight or 9 feet in width. They said these engines had become common in the streets of London, and there was much complaint on the subject. Public meetings had been held, and several of the Borough Councils were being pressed to initiate legal proceedings with a view to an abatement of the nuisance. Under the circumstances, they thought the Board should make representations on the subject to the Local Government Board, and they therefore recommended that a communication should be addressed to the Department calling attention to the damage to the Board's mains and pipes likely to arise from the passage of traction-engines and heavy motor cars. The recommendation was agreed to.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

There was a short sitting of the Edinburgh and Leith Gas Commission on Monday, lasting only two minutes. This was the statutory annual meeting, which I have before remarked has been strangely fixed to be held at a time when there is nothing "annual" to transact. The formal approval of minutes was the only business before the meeting; but notice was given by two of the members of a motion to remit to the Works Committee to consider whether, having regard to the large and increasing use of gas for heating, cooking, and motive power, and also for lighting with incandescent mantles, the time has now come for obtaining authority to reduce the candle power of the gas, and to report. This motion has, of course, been prompted by the example of the Glasgow Corporation, whose lead is likely to be followed soon by more than one body supplying gas in Scotland. That there is necessity for education upon the subject, is brought home by the comment of the Editor of an Edinburgh newspaper to the effect that, considering the many complaints which have been made as to the quality of the gas, he would have thought it more reasonable that the proposal should be to increase, rather than to reduce, the illuminating power. Even Editors are sometimes caught nodding.

The subject of the illuminating power of the gas supplied to the town has been raised in Inverness, where, it is reported, Bailie Gossip, at a meeting of the Town Council this week, said he honestly believed that the quality of the gas was not so good as it used to be; and he asked the Manager on what principle he found the illuminating power. The Manager (Mr. A. Thomson) said that the gas was tested three times a week, and that recently it was found the illuminating power was better than it had been in some previous years. He had been considering, on account of complaints from the district where Bailie Gossip resided, whether they should not lay a larger main. The matter was remitted to the Lighting and Watching Committee.

On the evening of Saturday last, a man named Easson, a builder, residing in South William Street, Perth, was found dead in his house, having been suffocated by coal gas. Easson was last seen on Friday morning. His non-appearance after that aroused the suspicion of the neighbours, who called in the police. When they entered the house, they perceived a strong smell of gas; and the occupant was found lying on the bed, fully dressed, and lifeless. He lived alone. There were no gas-fittings in the house; but Easson had made a connection with a service-pipe, apparently with the object of getting some gas for nothing. In the making of the joint he had used soft soap, which gave way; and thus his avarice led to his end.

Mr. A. Yuill, the Engineer and Manager of the Dundee Corporation Gas Department, on Thursday evening delivered a lecture to a crowded audience in the Arthurstone Library, on "The Proper and Economical Use of Gas." Councillor Mathers presided. Mr. Yuill described the gas-works, illustrated the generation of light, and gave practical demonstrations of the use of gas for heating and lighting, showing, in the latter case, the great superiority and economy of incandescent over flat-flame burners. Mr. Yuill was cordially thanked for his lecture.

The settlement was intimated in the Court of Session yesterday of the action, mentioned in these "Notes" on Jan. 31, which was brought by Mrs. Hannah Arthur or Graham, residing at No. 2, Valleyfield Road, Penicuik, against the Penicuik and District Gas Company, Limited. The pursuer and her husband suffered from gas poisoning on the night of Nov. 30, 1903, and her husband died. She attributed the occurrence to the decayed condition of a gas-main underneath their house; and she sued for £1000 as damages for the death of her husband, and for £500 as damages for injury to her own health. The action has been settled by a payment of £150 and expenses. This sum is believed to be considerably less than a jury would have awarded, and, of course, the costs of the trial have been avoided; so that the Company have acted wisely in getting the claim out of the way.

At the meeting of the Dunblane Town Council on Tuesday, a minute by the Gas Committee which was submitted stated that the Committee had asked an electrical engineering firm to give an estimate of the cost of an installation of electric light for the burgh, but that it had not yet come to hand. The Committee reported that they had received a letter from the Gas Company with reference to the Council acquiring their undertaking. The Council appointed a Sub-Committee to prepare a statement showing what negotiations have taken place between the Council and the Company with reference to a transfer, in order that it may be laid before the ratepayers for their information as to how matters stand.

The new gas-works at Falkirk are so far advanced that the local newspapers have begun to publish paragraphs about them. In one of these it is stated that excellent progress is being made. The retort-house and coal-store are practically finished, and the retort-bench will soon be in such a condition as will permit of the retorts being set. The purifier-house and lime-shed are also on the verge of completion; and the work of dismantling the holder at Bleachfield, the new foundation for which is nearly ready, is well forward. A start has been made

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 761.

Issue.	Share.	When Dividend.	Dividend or Interest & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
550,000	10	Oct. 13	10½	Alliance & Dublin 10 p.c.	21—22	..	4 15 5
100,000	10	,,	7½	Do. 7 p.c.	14⅜—15½	..	4 16 9
200,000	5	Nov. 11	6½	Bombay, Ltd.. . . .	6⅜—6¾	..	4 16 4
140,000	5	,,	6½	Do. New, £4 paid	4¾—5¼	..	4 19 1
50,000	10	Mch. 15	14	Bourne- 10 p c. . .	29⅜—30½*	+⅜	4 11 10
251,810	10	,,	7	mouth Gas B 7 p.c. .	16¾—17½*	+½	4 0 0
53,200	10	,,	6	and Water Pref. 6 p.c.	15⅜—16⅝*	+¼	3 12 9
380,000	Stk.	Feb. 24	12	Brentford Consolidated	245 - 250	..	4 15 0
300,000	,,	,,	9	Do. New . . .	18,—190	..	4 14 9
50,000	,,	,,	5	Do. 5 p.c. Pref. .	127—132	..	3 15 9
206,250	,,	Dec. 15	4	Do. 4 p.c. Deb. .	105—108	..	3 14 1
220,000	Stk.	Mch. 15	11	Brighton & Hove Orig.	223—228*	+½	4 16 6
246,320	,,	,,	8	Do. A. Ord. Stk. .	165—170*	+1	4 14 2
460,000	20	Sept. 29	10	British	41⅜—42½	+⅜	4 14 1
100,000	Stk.	Feb. 24	6	Bromley, Ord. 5 p.c. .	118—123	+3	4 17 7
165,700	,,	,,	4½	Do. do. 3½ p.c. .	90—94	..	4 15 9
500,000	10	Oct. 13	7	Buenos Ayres (New) Ltd.	12½—13	+½	5 7 8
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
150,000	20	Mch. 15	8½	Cagliari, Ltd.	25—27*	+⅜	6 2 3
100,000	10	Sept. 29	10	Cape Town & Dis., Ltd.	16½—17	..	5 17 8
100,000	10	Oct. 27	4½	Do. 4½ p c Pref.. .	9¾—10¼	+⅛	4 7 10
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	52—54	..	5 11 1
50,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	100—102	..	4 8 3
1,400,000	Stk.	Feb. 24	5⅛	Commercial 4 p c Stk. .	116—119	..	4 7 4
560,000	,,	,,	5	Do. 3½ p.c. do. .	112—115	..	4 6 11
450,000	,,	Dec. 15	3	Do. 3 p.c. Deb. Stk.	86—88	..	3 8 2
800,000	Stk.	,,	6½	Continental Union, Ltd.	115—118	−2	5 10 2
200,000	,,	,,	7	Do. 7 p c. Pref.	140—145	..	4 16 7
424,070	Stk.	Feb. 18	5½	Derby Con. Stk. . . .	—	..	—
55,000	,,	Jan. 3	4	Do. Deb. Stk. . . .	108—110	..	3 12 9
486,090	10	Jan. 27	11	European, Ltd. . . .	21½—22½	..	4 17 9
354,060	10	,,	11	Do. £7 10s. paid	14⅜—15⅝	..	5 6 6
£5,243,200	Stk.	Feb. 10	4⅜	Gas- 4 p.c. Ord. . .	93—100	−⅜	4 8 0
2,600,000	,,	,,	3½	light 3½ p.c. max. .	92—94	..	3 14 6
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	112—114	..	3 10 2
4,193,975	,,	Dec. 15	3	Coke 3 p.c. Con. Deb.	90—92	+1	3 5 3
258,740	Stk.	Mch. 15	5	Hastings & St. L. 3½ p.c.	100—103*	+2½	4 17 1
70,000	10	Sept. 29	11	Hongkong & China, Ltd.	16—17	..	6 9 5
3,800,000	Stk,	Nov. 11	10	Imperial Continental .	216—219	+2	4 11 4
473,600	Stk.	Feb. 10	3½	Do. 3½ p.c. Deb. Red.	96—98	..	3 11 5
175,242	Stk.	Mch. 15	6	Lea Bridge Ord. 5 p.c. .	118—123*	+3	4 17 7
561,000	Stk.	Feb. 24	10	Liverpool United A . .	221—223	+1	4 9 8
718,100	,,	,,	7	Do. do. B .	160-162	..	4 6 5

Issue.	Share.	When Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
306,083	Stk.	Dec. 30	4	L'rpool Unit'd Deb. Stk.	111—113	..	3 10 10
75,000	5	Dec. 15	5	Malta & Medn., Ltd. .	4—4½	..	5 11 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb..	103—105	..	4 15 3
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	103—105	..	4 5 9
541,920	20	Nov. 11	3½	Monte Video, Ltd. . .	11—12	+½	5 16 8
1,565,892	Stk.	Feb. 24	4½	Newc'tle & G'tesh'd Con.	106⅜—107½	..	4 6 1
406,125	Stk.	Dec. 30	3½	Do. 3½ p.c. Deb.	92—93	+1	3 15 3
15,000	10	Feb. 24	10	North Middlesex 10 p.c.	19—20	..	5 0 0
52,940	1	,,	7	Do. 7 p c.	13—14	..	5 0 0
300,000	Stk.	Nov. 30	8	Oriental, Ltd. . . .	148—151	..	5 6 0
600,000	5	Sept. 15	7	Ottoman, Ltd. . . .	6—6¼	..	5 12 0
235,005	Stk.	—	6½	Plym'th & St'house 5 p.c.	—	..	—
398,490	5	Apl. 28	5	Primitiva Ord. . . .	6⅛—6⅜	..	3 14 1
796,980	5	Jan. 27	5	Do. 5 p.c. Pref. .	4⅜—5¼	..	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb. .	95—97	..	4 2 6
851,070	10	Oct. 13	7	River Plate Ord. . . .	12⅜—13⅛	+⅛	5 5 8
300,000	Stk.	Dec. 30	7	Do. 4 p.c. Deb. .	96—98	..	4 1 8
250,000	10	Sept. 15	7†	San Paulo, Ltd. . . .	12½—12⅝	+⅛	5 9 10
70,000	50	Jan. 3	5	Do. 5 p.c. Deb. .	52—54	..	4 12 7
135,000	Stk.	Sept. 15	10	Sheffield A	238—240	..	4 3 4
209,984	,,	,,	10	Do. B	237—239	..	4 3 8
523,498	,,	,,	10	Do. C	236—238	..	4 4 0
123,998	Stk.	Sept. 29	5	Shrewsbury Ord. 5 p.c.	104⅛—107½	..	4 13 0
70,000	10	,,	11	South African	16—17	..	6 9 5
6,250,000	Stk.	Feb. 10	5⅛	South Met., 4 p.c. Ord.	129—131	..	4 4 0
1,832,700	,,	Jan. 13	3	Do. 3 p.c. Deb.	89—91	..	3 5 11
575,000	Stk.	Feb. 24	5⅛	S'th Suburb'n Ord. 5 p.c.	120—123	..	4 9 5
60,000	,,	,,	5	Do. 5 p.c. Pref. . .	122—.27	..	3 18 9
112,533	,,	Jan. 13	5	Do. 5 p.c. Deb. Stk.	130—135	..	3 14 1
502,310	Stk.	Nov. 11	5	Southampton Ord. . .	107—110	+1	4 10 11
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Feb. 24	6¼	Tottenham A 5 p c. .	125—128	+2	4 17 8
338,020	,,	,,	4¼	and B 3½ p.c. .	97—100	+1	4 15 0
125,000	,,	Dec. 15	4	Edmonton 4 p.c. Deb.	107—110	+2	3 12 9
182,380	10	,,	8	Tuscan, Ltd.	9½—:0	..	8 0 0
149,900	10	Jan. 3	5	Do. 5 p.c. Deb. Red.	100—102	..	4 18 0
30,000	Stk.	Feb. 24	7¼	Wands- A 5 p.c. . .	163—168	+6	4 12 3
255,636	,,	,,	6¼	worth B 3½ p.c. . .	135—140	+5	4 9 3
60,000	,,	,,	5⅛	and C 3½ p.c. . .	111—113	+3	4 16 0
57,564	,,	Dec. 30	3	Putney 3 p.c. Deb. Stk.	82—87	+2	3 9 0
745,872	,,	Mch. 15	5	West Ham 5 p.c. Ord. .	102—104*	+½	4 16 2
185,000	,,	,,	5	Do. 5 p.c. Pref. .	123—126*	+½	3 19 4
193,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	105—110	..	3 12 9

Prices marked * are Ex div. † Next dividend will be at this rate.

with the exhauster and meter houses. The chimney has been erected; and the work which remains to be done is principally the laying down of machinery. If everything goes well, the new works will be used next winter as supplementary works; and by the succeeding winter they will, it is anticipated, be able to supply the whole of the gas required in the district.

We were on the point of having a decision which would have been of interest, but for the present have avoided it, in a case stated under the Workmen's Compensation Act which was before the Second Division of the Court of Session on Thursday. The case arose out of an accident to a stone breaker named David M'Ewan, while at work in a yard in Perth belonging to the Gas Department. M Ewan was employed by the Road Department of the Corporation in the breaking of old causeway blocks into road metal. While at work, a chip of stone injured one of his eyes. The place where the accident occurred was a yard, part of which is occupied by the Gas Department, at the lower end of the South Inch. The part occupied by the Gas Department was separated from that of the Road Department by a fence composed of old railway sleepers. When this case was brought, the contention put forward on behalf of the workman was that the two parts were one yard, being enclosed by one ring fence; the reason for this argument being that within the enclosure of the Gas Department there were mechanical appliances which, it was believed, brought the Act into application. These mechanical appliances consisted of a gasholder, meter, and governor, which a workman visited occasionally to regulate, and a boiler for raising steam, which is used in cold weather to prevent the water in the holder tank from freezing. The only mechanical power was the water-seal in the station meter. No gas was made at the place. In the portion used by the Road Department there were no mechanical appliances. Sheriff Substitute Sym decided that a yard was a place for the deposit, as well as for the sale, of goods; that a yard was a warehouse in the meaning of the statute; and, being a warehouse, it was also a factory in the sense of the Act. He therefore found the Corporation liable to pay the workman a weekly sum which had been agreed upon. This decision did not proceed upon the pleas with reference to the gas plant; but, in preparing the case for the Appeal Court, he inserted the statement, and it was argued in the Court of Session—the contention being that the whole yard was one place, and that the place was one in which mechanical power was used. The view, however, was not pressed. The Court decided that the place was not a warehouse, and reversed the finding of the Sheriff. They were of opinion that the idea of "warehouse" was derived from a clause in the statute which is headed "docks, &c.," and that to apply it to places where goods are stored would be absurd, because it would bring every place in the country where there are stores within the Factory Acts, involving inspection and fines. To have even this settled may be of interest to gas managers; but their interest would have been greater if their Lordships had gone into the other question of the whole place being one or not. They did not directly answer this question; but one of them—Lord Kyllachy—said that if it had been necessary to deal with it, he would have been disposed to answer it in the negative. So, for the present, we are without a judicial pronouncement as to whether or not a gas meter and governor, with boiler for raising steam to prevent water from freezing, is mechanical power within the meaning of the Workmen's Compensation Act.

The Edinburgh and District Water Trust have fallen upon evil days. Last week I mentioned that they had been found by the Court of Session to be liable for £2000 damages for sending dirty compensation water down a stream; and this week they have been adjudged to pay the Clippens Oil Company, Limited, a much larger sum. The dispute between the Trust and the Clippens Company is now of old standing. It relates to the power of the Company to work shale and limestone out from below the main water-pipes of the Trust at Straiton and Pentland. The branch of the case dealt with in this action arises out of an application which the Trust made in 1897 to have the Company interdicted from working out minerals within 40 yards of the pipe-tracks. Interim interdict was granted in March, 1897; but after proof the interim interdict was recalled, in February, 1898. In the meantime, the Company had closed their works, and disbanded their staff. In this action they sued for £137,000 as the amount of loss to which they had been subjected by the interim interdict. Lord Pearson to-day decided that the Company were entitled to damages of a substantial nature. At the same time, he thought that if the Company had been willing to look forward they might have been able to tide over the crisis without much loss. He came to the conclusion that he should award the pursuers £15,000 and expenses.

Serious Fire at Messrs. Sugg and Co.'s—Early last Friday morning, the premises of Messrs. W. Sugg and Co., Limited, in Regency Street, Westminster, were seriously damaged by fire. It was discovered about half-past four o'clock, when it had obtained a strong hold of the basement and ground floors, and was spreading to the upper portion of the buildings. A force of ten steamers, long ladders, and nearly 100 firemen, under the direction of Mr. S. G. Gamble and Lieut. S. Sladen, R.N., were employed in suppressing the fire; and by daylight all chance of it spreading to adjacent property was at an end, and soon afterwards it was completely overcome. The following is the official report: "A range of buildings of two and four floors, covering an area of about 100 ft. by 60 ft. (used as workshops, offices, and stores). About one-half of the basement and ground floors severely damaged by fire, stairs from the basement to the fourth floor destroyed, fourth floor and the contents nearly burned out, and the roof destroyed; rest of the building and the contents damaged by fire, heat, smoke, water, and breakages (adjoining and communicating)." Although, as will be seen, the fire was a serious one, it was only partial, and will not greatly interfere with the carrying on of the business; Messrs. Sugg and Co. having made arrangements for the accommodation of the work which was done in the destroyed buildings.

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 18.

Sulphate of Ammonia.

There has been a fair amount of business doing during the week, but the easier attitude of the large makers has prevented any recovery in values, and last week's prices have barely been maintained. The closing quotations are £12 15s. per ton f.o.b. Hull, and £12 16s. 3d. per ton f.o.b. Liverpool and Leith. In the forward position no important first-hand business has transpired, but for delivery over near months orders are being taken speculatively abroad at below the equivalents of spot prices.

Nitrate of Soda.

In this article a good business is being done on the Continent, and, notwithstanding heavy arrivals, prices there are fully maintained. Local prices remain 11s. and 11s. 3d. per cwt., for ordinary and refined qualities respectively.

LONDON, *March* 18.

Tar Products.

There has not been much business doing during the past week; and prices are a little easier. There has been no business in benzol in London, as consumers will not pay more than 9½d.; while makers hold out for 10d., and do not care to sell forward even at this price. Business is reported in the North at slightly under 9d. per gallon for early delivery; some of the makers being evidently anxious to clear out stocks, which would account for their accepting such low prices. In 50-90 per cent., there is still a fairly good inquiry, especially for home consumption; but makers will not at present accept the prices offered by consumers, and do not appear anxious to sell for forward delivery. The demand for toluol seems to have slightly fallen off during the past week; but there is really nothing offering, and there is no change to report in the market as regards the actual value. Solvent continues dull; and there is certainly more offering, especially in the North of England. So far as London is concerned, the demand for home consumption does not appear to be well maintained. There is nothing whatever doing in anthracene, and prices are purely nominal. It would appear that even the "A" makers are abandoning the production, as it is very difficult to find buyers except at prices which are absolutely unremunerative to the producer. In carbolic acid, there has been a fairly good business doing in crude; but prices do not improve. Sales were made at 1s. 9½d., both in London and the North of England, and most makers now ask 1s. 10d. for forward delivery, at which price consumers decline to purchase, and only offer 1s. 9d. to 1s. 9¼d. for delivery April-June. There appears to have been rather more business doing in crystals; but there have not been many deals in creosote, although there is a very general opinion that the demand from America will be considerable a little later on. There are several inquiries in the market which do not at present lead to business. If, however, arrangements are completed for shipment in bulk from both London and Liverpool, it should decidedly improve the position of the article. The largest London makers are still firm in their ideas; and it would seem as if the smaller makers have now cleared out their stocks and are not pressed to sell, as was the case a little while ago. The Yorkshire makers appear fairly well sold. In the Manchester and Liverpool districts, however, manufacturers are certainly anxious to sell, but find considerable difficulty in realizing anything over 1⅛d. per gallon. The market in pitch is certainly a little easier all round, doubtless owing to the labour troubles in Belgium. London makers are still unable to offer anything for early delivery, and appear well sold for the next two or three months. There is, however, more disposition to consider business for September-December than was the case a little while ago, although producers' ideas are considerably over those at which consumers are willing to entertain business. Certainly contracts have been accepted by dealers at decidedly low prices for April-June delivery; while it is reported that in more than one instance business has been arranged over next season at very low prices. As regards the East Coast, one or two parcels were sold during the past week, but lower prices were accepted; while in the neighbourhood of Liverpool and Manchester there is a considerable quantity offering for early delivery. In South Wales, consumers do not seem at all anxious to purchase for early delivery, and in some instances are reported to be postponing quantities due under contract. There are, however, inquiries for delivery over the last six months of the year. But consumers decline to entertain business at the prices quoted by dealers; while makers are not particularly anxious to sell so far forward, owing to the great uncertainty which prevails as regards the market for tar.

The average values during the week were: Tar, 18s. to 22s. Pitch, London, 33s.; east coast, 30s. to 30s. 6d.; west coast, 30s. Benzol, 90 per cent., 9⅛d.; 50-90 per cent., 7⅛d. Toluol, 7⅛d. to 7¼d. Crude naphtha, 3d. to 3⅛d.; solvent naphtha, 8d. to 8⅛d.; heavy naphtha, 9½d. to 10d. Creosote, London, 1½d. to 1⅝d.; North, 1¼d. Heavy oils, 2d. to 2 1/16d. Carbolic acid, 60 per cent., 1s. 9½d. to 1s. 10d. Refined naphthalene, £4 to £8; salts, 16s. to 17s. 6d. Anthracene, "A" quality, 1⅝d. to 1¾d.; "B" quality, unsaleable.

Sulphate of Ammonia.

The market has been very quiet during the past week, and closes with a decidedly easier tone. At Beckton, the value may be taken as £12 17s. 6d.; but there does not appear to be any business doing even at this price. The South Metropolitan Company still quote £13 2s. 6d. on their own special terms; but buyers are not prepared to arrange contracts at this figure. In Leith, sales are reported at £12 16s. 3d. during the last few days for prompt delivery; but as regards forward, there is really nothing doing. Business at Hull has been very limited. Some small parcels were sold at £12 15s., which may be taken as the closing value, although buyers at present do not seem disposed to pay this price, and speak of lower figures ruling later in the month.

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Dealers in Benzol, Carburine, and all other Naphthas and Oils suitable for the Enrichment or Production of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

18, DEVONSHIRE STREET, BISHOPSGATE, LONDON, E.C.

COAL TRADE REPORTS.

Lancashire Coal Trade.

There is practically no change to report in the Lancashire coal trade. Prices remain unaltered. House coal is still the most unsatisfactory department of the trade. In engine fuel, round and slack, the demand continues brisk, and is likely to do so on account of the greatly improved business in the cotton mills, foundries, and general business establishments. Coal for shipping continues steady, both for the use of steam vessels and for export. Cannel and gas coal are in good demand. By the conditions of the Arbitration Court in the matter of miners' wages, whatever agitation there may be in some districts on the part of the workmen for an increase of pay, the Lancashire district is not affected, because the amount now fixed must run for about another twelve months. The quotations are: Best house coal 13s. to 14s. per ton at the pit, secondary 11s. to 12s., common 9s. to 10s, best slack 7s. to 7s. 6d, medium 6s. 6d. to 6s. 9d., common 5s. 6d. to 6s., and engine fuel 7s. 6d. to 8s. 6d.

Northern Coal Trade.

There has been a slight improvement in the demand for coal; but it is still only moderate, and some of the collieries are working short time. The advance of the spring will, however, bring the demand from the Baltic, which is one of the chief branches of the export coal trade here. Best Northumbrian steams are 8s. 9d. per ton f.o.b., second-class steams are 7s. 10d. per ton, and steam smalls are not so plentiful at 4s. 9d. to 5s. In gas coals, the deliveries on the home contracts are lower; but the foreign inquiry is fuller, and the current price for occasional cargoes varies from 7s. 9d. to 8s. 3d. per ton f.o.b. Contracts are in the market for some German and other ports; but the issue is as yet doubtful. In one case, some 34,000 tons have been sold for delivery over the year, at a price that is said to yield about 7s. 9d. per ton f.o.b.; but this depends much on the idea of the freight that is allowed for. The coke trade is steady; but gas coke seems a little irregular, though the lessening output should check the increase in the stocks.

Scotch Coal Trade.

Trade has rather gone back, which is a disappointment, as the expectation was the other way. It is in the foreign demand that the failure has arisen; and it is probable that it may be due to international causes. If so, it will be only temporary. The home demand keeps well up. For the week, the quotations were: Main 7s. 6d. to 7s. 9d. per ton f.o.b. Glasgow, ell 8s. 3d. to 9s., and splint 8s. 6d. to 8s. 9d. The shipments for the week amounted to 176,796 tons—a decrease of 47,988 tons upon the previous week, and of 16,217 tons upon the corresponding week of last year. For the year to date, the total shipments have been 2,122,865 tons—an increase of 358,153 tons upon the same period of 1904.

TRADE NOTES.

Methane-Hydrogen Plant at Truro.

We learn from Messrs. Biggs, Wall, and Co. that the methane-hydrogen plant which they have installed at the Truro Gas-Works is doing exceedingly well—even better than was anticipated. Arrangements have been made for publishing at an early date particulars of the plant.

Waller's Gas Valves and Exhausters.

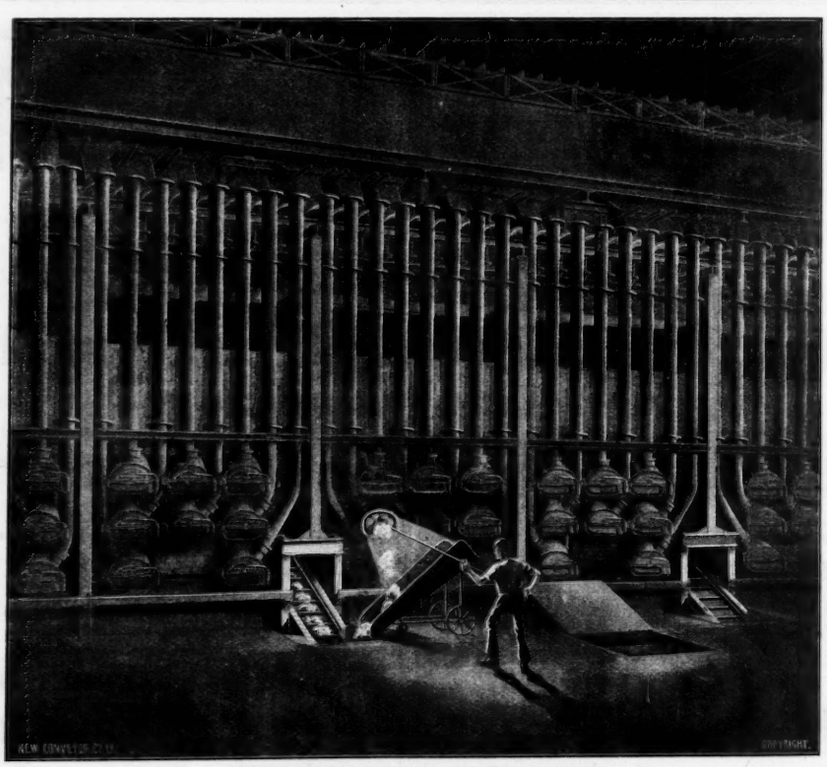
Messrs. George Waller and Son, of Stroud, Gloucestershire, have recently issued two supplementary catalogues which gas engineers and managers will find useful to have upon their office tables. The name of the firm is widely known in connection with their exhausters, and one of the catalogues (A) is mainly devoted to particulars of these appliances, which are all very effectively illustrated. A few remarks are made on the subject of converting existing exhausters to the firm's three and four blade type, in order to increase their capacity and give a steadier gauge. The rest of the catalogue is occupied with details of gas-governors, steam-regulators, exhaust and pressure registers, pressure gauges, pumps, coke-breaking machines, &c. The other catalogue (C) is devoted chiefly to valves, which are illustrated in great variety; but a number of accessories—including road gully gratings, hydrant and meter covers, air-tight inspection covers, &c.—are included.

Coal-Handling Plant by Messrs. Graham, Morton, and Co.

A unique installation of coal-handling plant, for which the Lea Bridge District Gas Company have placed an order with Messrs. Graham, Morton, and Co., Limited, is to be constructed to the plans of Mr. F. W. Cross, Assoc.M.Inst.C.E., the Company's Engineer. The plant is very complete, and, moreover, is simple in conception and promises to be effective in operation. A hydraulic waggon-tipper, capable of raising ordinary standard railroad waggons to an angle of 46°, is provided. It is suitable for a working pressure of about 700 lbs. per square inch. This hopper is fitted with a flat-bar screen on the top, so that all the large coal can be broken before passing to the elevator. The underside is arranged to accommodate a jigger feeder for regulating the supply of coal to the elevator, which is of the cased-in type; its dimensions being 18 inches, and 45 feet between the centres. It is provided with a breeches shoot at the head, with flap door, and levers for operating it. The band conveyor is of the 16-inch standard type, 106 feet between centres, and capable of conveying 25 tons of coal per hour at a normal speed of 200 feet per minute. A standard travelling throw-off carriage, for delivering the coal on either side of the conveyor, is to run the entire length of the stores. The friction-gear is so arranged as to admit of the carriage running in either direction, as required.

No Drawing Stage.

Perfect Regeneration.



Producer Fed with Hot Coke.

PATENT "DWARF" INCLINED RETORT-BENCH.

NEW CONVEYOR CO., LTD., SMETHWICK.

Reduction in Price.—The Exmouth Gas Company have decided to reduce the price of gas 2d. per 1000 cubic feet; making the cost to consumers 3s. 4d.

Fire at Tar-Works.—A destructive fire occurred on Sunday at Plough Road, Bermondsey, on the premises of Messrs. E. Catchpole and Sons, tar distillers. It is stated to have been caused by the overheating of a furnace, and it resulted in severe damage to the still-house and its contents.

Denbigh Town Council and the Water Company.—The Denbigh Town Council have resolved to oppose the granting of the Provisional Order for which the Water Company have applied, unless the latter will agree to the insertion of the following four provisions: That the whole supply for domestic purposes shall be obtained from the new source; that 25 gallons per head of the population shall be furnished; that the charge for water outside the area shall not be less than that paid by Denbigh consumers; and that the charge for flushing purposes shall be 1s. per 1000 gallons. As is indicated, the object of the Order is to enable the Company to introduce water from a new source. They also wish to raise further capital.

The Rainfall for the Present Year.—The "Weekly Weather Report" for the 11th inst., issued by the Meteorological Office, showed that the rainfall from the beginning of the year was still deficient in all districts except the northern parts of Scotland and Ireland; the deficiency amounted to 2 inches and upwards in several districts in England and in the South of Ireland. During the recent severe gales, however, falls of about an inch in 24 hours have been recorded in certain localities. In the neighbourhood of London, the rainfall during the part of the present month already elapsed has exceeded the mean for March, which is 1·5 inches. These heavy rains will help materially to relieve anxiety as to a possible shortage of water in the summer.

West's Stoking Machinery and Coal Plant for Beckton and Gloucester.—A contract has been placed with the West's Gas Improvement Company, by the Gaslight and Coke Company for a complete installation of their compressed-air stoking machinery for the No. 3 retort-house at the Beckton works, which house is being re-modelled, and will contain thirty through settings, each setting containing ten retorts. The contract comprises stoking machinery and coal-handling machinery, the latter including four coal-breakers, four elevators, four coal-conveyors, and eight coal-storage hoppers, each with a capacity of 45 tons. A contract has also been received from the Gloucester Gas Company for a complete installation of compressed-air stoking machinery, comprising two of West's combined compressed-air charging and drawing machines, air-compressor, elevator, conveyor, and storage hoppers in the retort-house, and a complete plant for storing the coal in the stores. This latter plant consists of a coal-breaker, over which is fitted an automatic feeder, elevator, and conveyor the whole length of the coal stores. The plant is capable of dealing with 30 tons of coal per hour.

The Typhoid Epidemic at Lincoln.—The latest reports to hand show that the epidemic of typhoid fever which has prevailed for some weeks at Lincoln is subsiding; most of the cases notified daily being those of children of very poor parents, and brought about by neglect. The river water is still chemically treated before being sent out. Auxiliary supplies are being brought in from Newark and Gainsborough; and the works now in hand for obtaining an independent supply from the sandstone formation are being pushed on as rapidly as possible.

Suggested Second Water Supply for Manchester.—From an article in the "Manchester Courier," we learn that Mr. A. M. Fowler is an advocate for the provision of a second water supply for Manchester, for trade, sanitary, and similar purposes. In addition to the water that might be pumped from below the city, Mr. Fowler calls attention to the effluent water now flowing from the sewage outfall works, at the rate of about 37 million gallons per day, which could be appropriated, to a large extent, for motive power, watering streets, sanitary uses, and for augmenting the supply of water to the Ship Canal at the docks, where it is urgently needed. As to the cost of raising this effluent water to a level which will render it available for use, Mr. Fowler says that there would be no difficulty in distributing it to consumers by gravitation at a pressure of upwards of 60 lbs. per square inch; and he is convinced that the water can be delivered at a cost not exceeding 2½d. per 1000 gallons. The effluent is, he says, made sufficiently pure for manufacturing purposes; the filtration through the beds at the outfall works leaving not more than a very trifling percentage of albuminoid ammonia in the water.

Featherstone Gas Company.—The half-yearly general meeting of the Ackworth, Featherstone, Purston, and Sharleston Gas Company was held on Wednesday afternoon, at the offices of the Company—Mr. J. Waller in the chair. The Secretary (Mr. J. Watson) read the Directors' report, in which they stated that the quality of coal carbonized had been 1230 tons, being an increase of 123 tons on the corresponding half of last year. The gas made had been 12,729,000 cubic feet—an increase of 1,566,000 cubic feet; while the make per ton (10,341 cubic feet) was also greater by 266 cubic feet. In submitting the accounts the Directors reported that the business continued to grow and prosper; and although the price of gas during the past half year had been reduced by 2d. per 1000 cubic feet, they were glad to find themselves in a position to recommend the usual dividends at the rate of 8 per cent. on the "A" stock and £5 12s. percent. on the "B" stock. They regretted that, in consequence of the breaking of a gas-main in Purston on Dec. 28, an explosion of gas took place in and about the adjoining houses, doing damage to the extent of £50. It was supposed that the main was broken by a traction engine passing over it. The amount required to meet this and the cost of making a new street would, however, be more than covered by the profits in excess of the amount needed for the dividends. The report was adopted and the payment of the dividends recommended sanctioned. The shareholders took tea together; and among the toasts proposed was "The Manager," to which Mr. George Moat responded.

CARBURETTED WATER-GAS APPARATUS

Merrifield—Westcott—Pearson Patents.

The Economical Gas Apparatus Construction Co., Ld.

W. H. PEARSON, Chairman.
W. H. PEARSON, Junr., Deputy-Chairman.
J. T. WESTCOTT, Manager.
L. L. MERRIFIELD, M.Inst.M.E., Engineer.

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CARBURETTED WATER-GAS ENGINEERS.

The above Company have erected since 1893, or are now erecting, their Universal Type of Carburetted Water-Gas Plant at the following Gas-Works:—

	Cub. Ft. Daily.		Cub. Ft. Daily.		Cub. Ft. Daily.
BLACKBURN	1,250,000	ST. CATHERINES (Remodelled)	250,000	TONBRIDGE	300,000
WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont.)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont.)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

LEEDS, 1,800,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.

AND IN ADDITION, 7,000,000 CUBIC FEET DAILY; also Coal-Gas Plants at NELSON, B.C., CHATHAM, BERLIN, NAPANEE, OWEN SOUND, CALGARY, and WINNIPEG.

Water-Works Extensions at Rhyl.—A Local Government Board inquiry has been held at Rhyl into an application by the District Council for sanction to borrow £7000 for the purpose of completing the new reservoir at Dolwen. The Clerk explained that the money was required to supplement £18,000 already borrowed for the work. Up to date, the water undertaking had cost Rhyl £126,610.

Ossett and Castleford Water Supply.—At a meeting of the Ossett Town Council on Monday last week, a resolution of the Water and Lighting Committee, expressing the opinion that it was desirable to join with the Castleford District Council in taking steps to acquire the Deanhead reservoir, in accordance with a scheme described in the "JOURNAL" for the 28th ult. (p. 593), was approved. It was further decided to call a ratepayers' meeting to discuss the question.

Visits of Scholars to Gas-Works.—On Saturday, the 11th inst., a party of the students of the Portsmouth Secondary School were permitted to inspect the new works at Gatcombe of the Portsea Island Gas Company; being accompanied by their instructors. They were received by Mr. J. D. Ashworth, the Engineer and General Manager, who thoroughly explained the process of gas manufacture, with the theory of which the students had previously been made acquainted in their chemistry course. The value of the practical knowledge to the students was fully acknowledged, and the visit, as a whole, was a very pleasant one. On the same day, the Science Students' Association of the Sir John Cass Technical Institute paid a visit to the works of the Croydon Gas Company at Waddon. After the inspection, the party were entertained by the Company at tea.

Paignton Water-Works.—An inquiry was held at Paignton last Wednesday, by Mr. W. O. E. Meade-King, one of the Inspectors of the Local Government Board, respecting an application by the District Council for power to borrow £41,000 for water-works purposes. It was explained that under their Act of 1900 the Council were authorized to borrow £70,000 for the construction of a reservoir at Holne Moor, the laying of the necessary mains, and the purchase of land and commoners' rights. Mr. F. Vanstone, the Resident Engineer, said £40,903 in excess of the parliamentary estimate would be needed to complete the work. Shortly after the Act was passed, it was arranged to supply Brixham with water, and more recently a similar arrangement had been made with Teignmouth. As a consequence, the dam was to be raised 3 feet. The amount of the present contracts was £60,880, and the estimated cost of the extra works was £29,926; the principal items being £8000 for additional masonry for the embankment, £7000 for excavations for foundations, £5000 for the concrete filling to complete the trenches, and £2000 for excavation and works for diverting water. The cost of the land and other expenses amounted to £11,821; and engineering and other fees to £8225. The total estimated cost was £110,903. Mr. Baldwin Latham said the parliamentary estimate was ample; but additional work was required, owing to the nature of the ground, which turned out very bad, and the raising of the height of the dam. The reservoir would cost about £292 per million gallons.

Sulphur in Wandsworth Gas.—At the meeting of the Wandsworth Borough Council last Wednesday, the Gas Examiners presented a report on the subject of the sulphur in the gas of the Wandsworth and Putney Gas Company. He reminded the Council that on the 26th of November last, the sulphur reached the excessive maximum of 34·3 grains in 100 cubic feet of gas, and the average for that fortnight was 19·2 grains. Since then the Company had not, he said, experienced any difficulty in removing the excess of sulphur impurities, inasmuch as during December, January, and February the total average had been 0·9 grains. A table was appended to the report giving details of the figures from which this average had been obtained.

Wakefield Water Supply.—The annual report of the Wakefield Water Engineer (Mr. C. Clemsha Smith) states that the average daily consumption of water in the city last year was 2,551,000 gallons; the amount per head for domestic purposes (including all supplies other than by meter) being 20·6 gallons. The continued efficiency of the Deacon meter system of waste prevention is, he says, borne out by the fact that the consumption for 1904 was less than ½ per cent. greater than that for 1898, while the revenue was £2800, or 10 per cent., more. The treatment of the water with carbonate of lime before filtration, and quicklime after filtration, has been continued by means of the temporary plant installed in 1903; and the results have continued to be satisfactory in reducing the action upon lead to a minimum. During the first five months of the year, the rainfall was up to the average; but the autumn drought seriously reduced the storage—the lowest point being reached on Nov. 7, when only 85 days' supply was on hand to meet the needs of the town.

Gas Supply at Rushden and Higham Ferrers.—At the recent annual meeting of the Rushden and Higham Ferrers Gas Company, the Directors reported an increase of 6,074,003 cubic feet last year in the gas sold, compared with 1903. The sales of gas realized £12,832, against £12,675; and the profits amounted to £3994, compared with £4290. The decrease was attributable to the large amount expended on the repair and maintenance of plant; upwards of £1100 being spent for the rebuilding of the retort-beds. The Directors have resolved to again reduce the price of gas, as from the 1st of January last by 2d. per 1000 cubic feet, which will represent a further gain of £756 to the consumers; making upwards of £1500 in two years. The price of gas will now be 2s. 7d. net for ordinary purposes and 2s. 4d. net for motive power; the charge to prepayment consumers being 3s. 1d. per 1000 cubic feet (27 cubic feet for 1d.). The amount available for distribution allowed of the payment of dividends at the rates of £11 and £7 14s. per cent. on the original and additional stocks, both free of income-tax. The Directors thanked the Engineer and Manager (Mr. T. Watson) and his staff for the efficient manner in which they had conducted the Company's business. It may be mentioned, in this connection, that the quantity of coal gas sold was at the rate of 10,535 cubic feet per ton; but including the "blue" water gas, 13,581 cubic feet per ton of raw material.

Where Richmond's started in 1890.

BOY (*log.*):—"They began here, and have spread **all over the world** since we were born."

ADVERTISEMENT OF THE RICHMOND GAS STOVE & METER CO., LTD. LONDON: 132, QUEEN VICTORIA STREET, E.C. WORKS & OFFICES: WARRINGTON & STRATFORD.

A Painters' Complaint at Rochdale.—Complaint has been made by a deputation to the Rochdale Gas and Electricity Committee of the employment of inexperienced men on certain works, to the disadvantage of properly qualified local painters. The Committee explained that they employed a practical man to do all special work, but that the painting of gasholders and lamp-posts was done by casual workers; it being understood that the latter work was not such as practical painters desired. Under these circumstances, the Committee replied that they did not see their way to alter the existing arrangements.

Gas or Electricity for Promenade Lighting.—The Lighting Committee of the Colwyn Bay Urban District Council have been considering the question of lighting certain portions of the promenade. To enable them to come to a decision on the matter, sample gas and electric lamps were fitted up, and a return was compiled by the Surveyor upon the public lighting of sea fronts and promenades in other resorts. As a result of the knowledge thus acquired, they recommended the selection of gas; but the Council are apparently in no hurry to adopt this view, for they have referred the proposal back to the Committee.

Gas-Pipe Gun-Barrels.—A writer in a monthly magazine mentions a circumstance which shows the curious changes which the whirligig of time brings about. When Murdoch was casting about for a suitable kind of tube for the conveyance of his newly-discovered gas, he, in order to be on the safe side, selected gun-barrels for the purpose. "In view of latter-day usage," says the "Ironmonger," "when flimsy compo. piping is often used for inside gas-services, Murdoch's precaution seems a trifle absurd. At the present time, some reckless people, infected with the rage for cheapness, rush to the opposite extreme, and, so far from using gun-barrels for gas-piping, make use of gas-piping for the manufacture of gun-barrels. Such is the irony of trade happenings in this Twentieth Century."

Water Supply of Saltash.—Unanimous approval was given by the Saltash Town Council last Tuesday to the new agreement with the Plymouth Town Council for supplying water to Saltash for thirty years from the 1st prox., at 6d. per 1000 gallons, to which reference was made in the "JOURNAL" last week. Alderman Meadows, the Chairman of the Water Committee, said that though they would have to pay 2d. per 1000 gallons more for water during the next seven years, until their present lease had run out, its extension for thirty years was most valuable. They would get a greater pressure of water than they had now; and if the supply was insufficient, Plymouth would go to the expense of laying a larger main. The minimum was 4 million gallons per quarter, and there was no maximum. Their Engineer had advised them that they were getting a cheap supply.

Truro Corporation and the Water Company.—A report was presented to the Truro City Council last Tuesday with reference to the opposition to the Bill promoted by the Truro Water Company. The report stated that the Town Clerk had advised the Sanitary Committee that the success of the Council's petition against the Bill would depend largely upon whether the Council could satisfy the Lords Committee that they had a *bonâ fide* intention to purchase, and would undertake to bring in a Bill in the next or the following session to carry out the idea. The Committee had carefully considered the possibility of such a course being practicable, and of the property being acquired on terms beneficial to the ratepayers; and they recommended that the question of proceeding with or discontinuing the opposition to the Bill be left entirely in the hands of the Committee, with power to authorize the Town Clerk to act generally on behalf of the Council. The report was adopted; but the hope was expressed that the Committee would have an opportunity of meeting the Directors of the Company.

Quality of the Gas at Burslem.—On the minutes of the Gas Committee coming up at the monthly meeting of the Burslem Town Council, Mr. Malkin called attention to the fact that, whereas the quantity of the sulphur in the gas was formerly 8 grains per 100 cubic feet, it was now 17·10 grains. This rise he thought remarkable, because there had been practically no increase in the amount of gas delivered in the mains. The Committee some time ago asked for more purifiers; and he could hardly understand (though there must be some good reason) why the impurities were present in such large quantities. Mr. Johnson, the Chairman of the Committee, explained that about fifteen months ago there were many complaints regarding the quantity of sulphuretted hydrogen the gas contained; and to remedy this state of things, a new system of purification—by oxide of iron—was adopted. This removed the sulphuretted hydrogen, which was very injurious; but it was not expected to remove altogether the sulphur, which was quite safe so long as it was not present in greater quantities than 20 grains per 100 cubic feet. Though the Council had voted £6000 for new purifiers, the Committee had not spent the money, because they had not yet obtained the Provisional Order which they required. He concluded by pointing out that for some months past the average amount of sulphur in the gas was not more than 15 grains.

Fylde Water Board Provisional Order.—An inquiry has been held at Blackpool by Mr. E. P. Burd, on behalf of the Local Government Board, into an application by the Fylde Water Board for a Provisional Order to enable any local authority whose district or part of whose district is within the water limits of the Board, to contract with them for a supply of water on terms so as to make up the difference between the aggregate amount of the water-rate payable to a sum equal to 6 per cent. of the expense of providing the necessary mains. The Clerk to the Board (Mr. T. Loftus) pointed out that quite recently the Board had an application for a supply of water from the Preesall Urban District Council; and in that case the difference between the aggregated amount of water-rate payable and the cost of laying the necessary mains and pipes would be between £500 and £600. He wished the Order to be granted early so that it might be passed in this session of Parliament. Mr. Forshaw, on behalf of several Rural Councils, contended that under the Water-Works Clauses Act it was only necessary for a local authority to give a guarantee for three years; but the Inspector pointed out that it would be unfair to the Board, after going to great cost in laying down the mains, to probably have to supply water at a loss after the first three years. Mr. Forshaw remarked that his clients had offered to pay the costs of a test case on the point; but the Board had not fallen in with the idea.

SEASON 1905.

TAKING LINES WITH GAS COMPANIES.

The "MAIN"

Slot Cookers

15 DIFFERENT SIZES.

Specially Designed for Hiring.

R. & A. MAIN, LIMITED,

LONDON AND GLASGOW,

ALSO AT

FALKIRK, BIRMINGHAM, BRISTOL,
MANCHESTER, MELBOURNE, AND SYDNEY.

High-Pressure Gas Lighting in Birmingham.—It is stated that the Birmingham Gas Department have arranged with the Committee promoting the Trades Exhibition to be held at Bingley Hall, under the auspices of the Hospital Saturday Committee, to light the centre bay of the hall with gas supplied at high pressure. The intention is to light this bay with four cluster burners, yielding 6000-candle power each, or 24,000-candle power in all. In addition, a scheme has been devised for carrying away the foul air from the building to the outside of the roof by means of air-shafts placed over the burners.

Lowestoft Water and Gas Company.—At the annual meeting of this Company next Monday, the Directors will report that satisfactory progress was made in the business, in both departments, during the year 1904; and that the machinery and works, which are under the supervision of Mr. Joseph Hawksley, Assoc.M.Inst.C.E., the Manager, are in good order. The sale of gas produced £15,490; of water (with meter-rents), £15,806. There was an expenditure of £13,635 on the former, and of £5596 on the latter account. There is a sum of £8485 available for distribution; and the Directors recommend dividends at the rates of 7½ and 5¾ per cent. per annum for the past six months.

Electricity Not Wanted at Louth.—A proposal that electricity works should be established by the Louth Town Council at a cost of £13,010, has been rejected, though only by the narrow majority of one. When the matter was under discussion, Alderman Hickling said he calculated that a loan of £13,010 would involve an annual expenditure of £750, to which had to be added £450 for working. The income from public lighting he estimated at £300, and that from private lighting at from £250 to £300. He therefore put the annual loss likely to be incurred at from £500 to £600. The Mayor (Alderman Simpson), however, gave it as his opinion that the income would be double what had been mentioned by Alderman Hickling.

Failure of the Electric Light at Battersea.—Very serious inconvenience was experienced at Battersea on Saturday night by the complete failure of the electric light, owing to the fusing of a wire at the generating station. For an hour-and-a-half during the busiest part of the busiest evening of the week, the tradesmen who had unwisely adopted electricity found themselves with only such light as could be improvised on the spur of the moment. Serious as the mishap was from a shopping point of view, however, it was more so as regarded the various places of amusement. At the Shakespeare Theatre and the Empire Music Hall stampedes were narrowly avoided by the prompt action of the Managers, who explained that the darkness would be only temporary. At the latter place, it was finally determined to close the house and return all money taken; and the task of emptying the hall was accomplished by a number of police constables. One report states that for about two hours pandemonium reigned in some parts of the district, where there were no lights in the shop windows.

Fatal Acetylene Explosion at Watton.—A young man named Rolfe, who was employed as a motor and cycle repairer at Watton, a few days ago met with a shocking death as the result of an explosion which occurred in connection with an acetylene apparatus. Deceased had been instructed to repair a leakage in the piping; and after the occurrence several used matches were found lying under the gas-jet opposite the apparatus. The doctor who saw deceased at the hospital stated at the inquest that there were wounds over the right eye and under the left one. They penetrated 3 inches into his skull; and the bones were evidently driven into his brain. In his opinion, the deceased must have been looking over the top of the generator, and the two screws from which he had removed the top must have caught him in the face, thus causing the deep wounds. Mr. Veysey-Smith, an Inspector of Factories, who attended the inquiry, pointed out the explosive nature of acetylene. He said that a mixture of acetylene and air commenced to be explosive when it contained 3 per cent. of acetylene; whereas with coal gas and air, 8 per cent. of coal gas was required. Evidently deceased had disconnected the generator at the bottom; and having no experience, he lit a match. The Jury returned a verdict that the deceased met his death accidentally, and added, as a rider, that great care should be used in dealing with acetylene, especially by amateurs.

The Beverley Town Council have decided that in future cookers shall be supplied free to all persons having prepayment gas-meters.

The Otley Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for Waddell's regenerators.

Resolutions have been duly passed for the winding-up, voluntarily, of Bryan Donkin and Clench, Limited; and Mr. A. G. Webb, of Lincoln Works, Chesterfield, has been appointed Liquidator.

Messrs. Edgar Allen and Co., Limited, of Sheffield, have just received a large contract from the Sheffield Corporation for the supply of coal-handling plant, including storage hoppers, coal-shoots, measuring chambers, &c.

On the advice of the Engineer-in-Chief (Mr. Henry Hack), the Gas Committee of the Birmingham Corporation have decided to fit Cutler's patent interlocking gears to their six large sets of carburetted water-gas plant atthe Nechells station.

Messrs. F. C. Sugden and Co. have had orders placed with them for shallow regenerator settings by the Blaenavon Gas and Water Company, Limited, and the Llanidloes Gas, Coal, and Coke Company, Limited. The former is a repeat order.

The Padiham District Council have paid £126 3s. 6d. in claims for damages sustained to property in the town by the gas explosion which occurred some weeks ago (*ante*, pp. 112, 186); and instructions have been given for the damaged buildings to be repaired.

Among the work which Messrs. Joseph Taylor and Co., of Bolton, have in hand at the present time are solid plate lead saturators for the Westgate and Birchington Gas Company and the Hinckley Gas Department, and alterations to the sulphate of ammonia plant (including a set of condensers, new stores, mother liquor well, &c.) of the Longridge Gas Company.

THE

PARKINSON'S

"CROWN"

COOKER

SHOWING HOT-PLATE

HINGED TO FACILITATE

CLEANING OF BURNERS, &c.

PARKINSON AND W. & B. COWAN, LTD.

(*Parkinson Branch*),

COTTAGE LANE, CITY ROAD, LONDON.

BELL BARN ROAD, BIRMINGHAM.

The National Carbide Company, Limited, has been registered with a capital of £50,000, in £1 shares (5000 preference, 35,000 ordinary, and 10,000 as may be decided), to adopt an agreement with the Mann George Depôts, Limited; to undertake the manufacture, purchase, and sale of carbide of calcium and kindred products and the primary materials therefor (especially oxide of calcium); to manufacture and deal in electro-chemical products and apparatus and electrical or mechanical plant; and to carry on business as electricians and engineers, &c. There will be no initial public issue.

An exhibition of gas stoves and appliances was held under the auspices of Newport (Fife) Town Council last week, in the Stewart Hall, in that town. Mr. Middleton was the lecturer; and he explained that he was not there so much for the purpose of teaching cooking, as for showing people how to use gas-cookers in order to get the greatest amount of efficiency from them, as so much depended upon the oven being at the proper temperature before putting in the cakes, pastry, or meat. A representative of the Richmond Gas Stove and Meter Company, Limited, was present, and described the various appliances.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

GENERAL MANAGER (SOUTH AMERICA). No. 4364.
ENGINEER AND MANAGER. Rotherham Gas Department. Applications by April 3.
CARBONIZING AND WORKS FOREMAN. No. 4362.
CHIEF INSPECTOR. Wandsworth and Putney Gas Company. Applications by April 5.
CARBONIZING FOREMAN. Wigan Gas Department.
MANAGER SLOT INSTALLATION WORK. No. 4360.
CHARGE OF WORKS. Theale Gas Company.
CLERK. Lincoln Water Department.
CANVASSERS. No. 4363.

Situations Wanted.

COOKERY LECTURER. No. 4361.
JUNIOR CLERK (GAS OR WATER COMPANY). Field, Upper Parkestone.
RETORT SETTER. G. R. S., Preston.

Plant, &c., for Sale.

ENGINES AND BOILER. Sheffield Water Department.
PUMPING ENGINE, PUMPS, &c. Birmingham Water Department.
PURIFIERS, &c., TOWER SCRUBBER, WASHER, CONDENSERS, ENGINES, AND EXHAUSTERS, &c. Halifax Gas Department. Tenders by March 29.

Partnership.

MIDDLETON AND BROWN, Glasgow.

Slot Installation Work. No. 4358.

Tar-Works for Sale.

REGINALD BARROW, Clayton.

Company Meeting.

BRITISH GASLIGHT COMPANY. Offices, March 29. Twelve o'clock.

Stocks and Shares.

CROYDON GAS COMPANY. April 3.
GREAT YARMOUTH WATER COMPANY. April 11.
ILFORD GAS COMPANY. April 11.
SOUTH ESSEX WATER COMPANY. April 11.
SOUTH METROPOLITAN GAS COMPANY. March 28.

TENDERS FOR

Carbon.

BIRKENHEAD GAS DEPARTMENT. Tenders by March 23.

Coal and Cannel.

NEWPORT GAS DEPARTMENT. Tenders by April 3.

Coke.

WANDSWORTH AND PUTNEY GAS COMPANY. Tenders by March 24.

Condenser.

HINDLEY GAS DEPARTMENT. Tenders by March 31.

Excavation and Concrete.

WOKING GAS COMPANY. Tenders by April 1.

Oxide.

BIRKENHEAD GAS DEPARTMENT. Tenders by March 23.

Pipes.

SALFORD GAS DEPARTMENT. Tenders by March 30.

Tar and Liquor and Light Oil.

BRIDGEWATER COLLIERIES. Tenders by April 3.
HAWORTH GAS DEPARTMENT. Tenders by March 29.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.
Payable in Advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in Advance.

All Communications, Remittances, &c., to be addressed to
WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.
Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

OXIDE OF IRON.

O'NEILL'S OXIDE has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

GAS PURIFICATION & CHEMICAL CO., LD.
JOHN WM. O'NEILL, Managing Director,
PALMERSTON HOUSE, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

SULPHURIC ACID for Sale, specially suitable for making Sulphate of Ammonia.
BROTHERTON AND CO, LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

HYDRATED OXIDE OF IRON.
PREPARED from Pure Iron.
Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Exchanged for Spent Oxide.
READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We guarantee promptness, with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: SATURATORS, BOLTON. Telephone 0848.

BIGGS, WALL, & CO., 13, Cross Street, Finsbury, E.C. *Telegrams:* "RAGOUT," LONDON. *Telephone:* 273 CENTRAL.
CHARGING MACHINES—See Advt. in last week's issue.
EXHAUSTING MACHINERY—See Advt. in this week's issue.
SATURATORS—See Advt. in next week's issue.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 254 Oldham, and 2412 HOP, London.
Telegrams:—
"BRADDOCK, OLDHAM," and "METRIQUE, LONDON."

DUTCH OXIDE OF IRON.

THE First Dutch Bog Ore Co., Ltd, (Eerste Hollandsche Yzererts Maaty), ROTTERDAM.
General Manager (for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.
London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.
General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, AND WAKEFIELD.

GASHOLDER PAINTING.
PAINTING Work for all kinds of Gas- Works Plant undertaken by contract or otherwise.
FREDERICK BOYALL, 31, Regent's Row, Queen's Road, DALSTON, N.E. Established 1850.

SPENT OXIDE.
THE South Metropolitan Gas Company are always open to receive OFFERS of SPENT OXIDE.
Chief Office: 709, Old Kent Road, London, S.E.
Telegrams: "METROGAS, LONDON."

PATENTS AND TRADE MARKS
PUBLICATIONS, "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

OXIDE OF IRON.
(NATURAL.)
BALE & CHURCH will be pleased to send Quotations and Samples on application.
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT for all Retort and Furnace work.
PAINT for Gasholders, Purifiers, &c.
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manu- facture of SULPHATE OF AMMONIA.
SPENCER, CHAPMAN, AND MESSEL, LIMITED, 36, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341, AVENUE.

BROTHERTON & CO., LIMITED.
Offices: Commercial Buildings, LEEDS. Correspondence invited.

ATTERTON'S Patent Charging Machine, especially adapted for Small Works up to 50 Millions. Nearly 40 already supplied, and still supplying. Would soon repay for small outlay. Increased make and reduction in cost.
Apply to E. PADFIELD AND CO., 96 & 98, Leadenhall Street, LONDON, E.C.

GAS TAR and AMMONIACAL LIQUOR wanted by
GEORGE MILLER AND CO., Tar Distillers, 40, West Nile Street, GLASGOW.

"VITERNUS" METALLIC PAINT FOR GAS-WORKS PLANT.
JOHN E. WILLIAMS AND CO.,
LOWER MOSS LANE,
MANCHESTER, S.W.
Telegrams: "ENAMEL." National Telephone 1759.

JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

ROBERT DEMPSTER & SONS, Ltd., Contractor for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, Rose Mount Iron-Works, Elland.

OXIDE OF IRON.

WESTBURY OXIDE is now being extensively used for Gas Purification.
For Price and Analysis write to the New Westbury Iron Company, Limited, Westbury, Wilts.

GLASS SHADES of every description, for all kinds of Interior **GAS LIGHTING.**
Illustrated sheets on application,
JOHN WALSH WALSH,
Soho and Vesta Glass Works, BIRMINGHAM.
Telegrams: "Vesta, Birmingham."
National Telephone: No. 63.
London Show-Room: 4, Holborn Circus, E.C.

PARTNERSHIP.

A FIRM of Gas Engineers and Contractors for General Supplies, with Well-Established Connection among Gas Companies and Corporations, desires PARTNER (Sleeping or Active) with moderate capital. Business capable of considerable extension. Good returns. No bad debts. Replies treated as strictly confidential.
Apply to Geo. Middleton and Brown, Solicitors, 83, Bath Street, Glasgow.

JUNIOR Clerk (age 19) seeks Situation in Gas or Water Company's Office. 2½ years' Experience.
Address Field, Tennyson House, Layton Road East, Upper Parkstone, Dorset.

GAS COOKERY LECTURER.

LADY (First-Class Diplomée), Experienced, wishes Appointment in connection with Gas Company.
Address No. 4361, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

RETORT Setter wants Situation. Accustomed to Drawings, can take own dimensions of new work or repairs, or alterations, make Drawings, superintend the Erection of Retort-Benches and Iron-work and Retort-Houses complete. No objection to going abroad.
Address G. R. S., 52, Mona Terrace, Ashton, Preston, Lancs.

WANTED, Clerk in Water-Works Office. One with a technical knowledge and accustomed to the work preferred.
Apply, stating Age, previous Experience, and Salary required, to the Water-Works Engineer, Corporation Offices, Lincoln.

SLOT INSTALLATIONS—Capable Man competent to Manage and carry out this class of work.
Apply, by letter, stating previous Experience, Salary required, and all Particulars, to No. 4360, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

GENERAL Manager wanted for South American Gas-Works. Three Years' Engagement. Passage out and Home free. Commencing Salary £850 per Annum, with Residence free.
Applications, stating Age, whether Married, Qualifications, and previous Experience, and enclosing *copies* only of recent Testimonials, to No. 4364, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

COUNTY BOROUGH OF WIGAN.
(Gas Department.)

WANTED, a good Carbonizing Foreman.
Particulars on application to the undersigned, to whom application, in writing only, must be made.
Testimonials not required; but References must be given.
J. Timmins,
Engineer, &c.
Wigan, March 18, 1905.

CARBONIZING AND WORKS FOREMAN.

WANTED, immediately, an Experienced Reliable Man as GENERAL CARBONIZING and WORKS FOREMAN, for a Works producing 500 Millions per Annum. Must understand all Machinery used in connection with Gas-Works, and have held a similar appointment. House, Coke, and Gas provided.
Apply, with not more than Three References, stating Experience, Age, and Wages required, to No. 4362, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CHIEF INSPECTOR REQUIRED.

WANTED by this Company a Chief INSPECTOR, with full Experience in all departments, to supervise under the direction of the Engineer, the whole of the Outdoor Work, Mains, Services, Ordinary and Automatic Installations, Stoves, Public and Private Lighting, &c., &c.
Salary £200 per annum.
Applications to be delivered to the undersigned, marked "Inspectorship," accompanied by Testimonials and giving fullest Particulars, Age, &c., by April 5.
By order,
Chas. W. Braine,
Secretary.
North Street, Wandsworth, S.W.,
March 18, 1905.

CAPABLE man wanted to Take Immediate CHARGE of small country Gas-Works. Must understand Gas Making and Fitting. Cottage found.
Apply to the Secretary, Theale Gas Company, Theale, Reading.

GAS-STOVE TRADE.

EXPERIENCED Canvassers wanted at once. Salary and Commission and Rail Fare paid. Excellent remuneration earned by good men.
Apply, by letter, to No. 4363, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

COUNTY BOROUGH OF ROTHERHAM.

THE Corporation of Rotherham invite APPLICATIONS for the Appointment of ENGINEER and GENERAL MANAGER of the Rotherham Corporation Gas-Works, at a commencing salary of £500 per Annum.
The person appointed will be required to take Full Charge of the Manufacturing and Commercial Departments of the Gas-Works, and will be required to perform all the duties usually performed by a Gas Engineer and General Manager. He must also be capable of carrying out all necessary Extensions of the works.
Preference will be given to Applicants Experienced in the working of Inclined Retorts and Regenerative Furnaces.
The gentleman appointed must devote the whole of his time to the duties of the Office, and will be allowed one articled pupil.
Applications, stating Age, Experience, and Qualifications, and accompanied by not more than Three recent Testimonials, to be sent to me on or before Monday, the 3rd day of April next, endorsed "Gas Engineer and Manager."
Canvassing, either directly or indirectly, will be an absolute disqualification.
By order,
W. J. Board,
Town Clerk.
Town Hall, Rotherham,
March 17, 1905.

OLD Established Tar-Works For Sale. Plenty of room to extend on valuable Plot of freehold land. Situated on Canal.
Apply, Reginald Barrow, Clayton, Manchester.

NEW Gasholder, 40 ft. diameter by 12 ft. deep, with Steel Standards; also new STEEL TANK to contain same.
Write J. Wright, 181, Queen Victoria Street, London, E.C.

TEST PLANT FOR SALE—We have several small Sets of GAS APPARATUS suitable for Test Plants, including Retorts, Condensers, Scrubber, Purifiers, Gasholders, overhauled and guaranteed, or New throughout.
Firth Blakeley and Co., Thornhill, Dewsbury.

FOR Sale, cheap, a Wrought-Iron SCRUBBER, 20 ft. high by 3 ft. diameter, with 6-inch Valves and Connections.
COCKEY'S WASHER, to pass 100,000 cubic feet per diem., with 6-inch Valves and Connections.
Apply to Saml. While and Son, 60, Queen Victoria Street, E.C.

PURIFIERS, &c., FOR SALE—Sets of 4 ft., 5 ft., 6 ft., 8 ft., 9 ft., 10 ft., 12 ft., 18 ft. squares; also 16 ft. by 12 ft., &c. SCRUBBERS, 8 ft. by 60 ft. 10 inch, 18 inch Square METERS. EXHAUSTERS up to 50,000 feet per hour in Stock. GASHOLDERS and TANKS, also New. State requirements.
Firth Blakeley and Co., Thornhill, Dewsbury.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters. Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. Blakeley, Gas Engineer, Thornhill, Dewsbury.

SHEFFIELD CORPORATION WATER-WORKS.

LANGSETT RESERVOIR.

FOR SALE—Two 10-Horse power Portable ENGINES, by Clayton & Shuttleworth; and One 12-Horse Power Vertical Cross-Tube BOILER, 11 ft. by 4 ft. All in thorough working order and repair.
For Price and particulars, apply to W. Terrey, General Manager, Water Department, Town Hall, Sheffield.

WATER-WORKS PUMPING-ENGINE FOR SALE.

MODERN Compound Surface Condensing PUMPING-ENGINE and WELL PUMPS for a depth of 200 feet. Engine Cylinders, 25 inches and 54 inches by 5 feet Stroke. Pump 24 inches diameter.
STEEL RISING MAIN, with lowering Rods and Screws.
Further Particulars and order to view to be obtained from the Secretary, Corporation Water Offices, Birmingham.

TENDERS FOR COAL.

THE Town Council of Newport, Fife (Gas Department), invite TENDERS for the supply of CANNEL, Single, Double, and Treble NUTS, and COKING DROSS, per Ton delivered at their Railway Siding for Twelve Months.
Tenders to be addressed to John Scrimgeour, Esq., Town Clerk, not later than Monday, the 3rd of April.
The Council do not bind themselves to accept the lowest or any Tender.
John F. Black,
Manager.
Gas-Works, Newport,
March 17, 1905.

TO SLOT INSTALLATION CONTRACTORS.

WANTED, price for Fitting up 200 Houses with ⅜-inch Compo. Pipe from Meter to Gas-Stove, and ¾-inch Compo. Pipe to Four Lights. Meter, Stove, and Gas-Fittings to be found by advertiser.
Address No. 4358, care of Mr. King, 11, Bolt Court, Fleet Street, E.C.

COUNTY BOROUGH OF HALIFAX.

THE Gas-Works Committee of the Halifax Corporation invite TENDERS for the purchase of the following PLANT now out of use at their Gas-Works:—
Four PURIFIERS, 21 ft. by 28 ft. by 5 ft. 6 in. deep, complete with Dry Centre Valve and 18-inch Connections.
Cast-Iron GIRDERS and COLUMNS supporting Purifiers 11 ft. 6 in. above floor level.
One Overhead TRAVELLING CRANE, 51 ft. 8 in. span, used in connection with the above Purifiers.
One TOWER SCRUBBER by R. Dempster and Sons, 1878, 60 ft. high, 12 ft. diameter, filled with boards. Complete with Spiral Staircase, Balcony, and 18-inch diameter Valves, Connections, and Bye-Pass.
One Laycock and Clapham's Patent ROTARY WASHER, 21 ft. by 8 ft. 2 in. by 8 ft. 2 in. Complete with 18-inch diameter Valves, Connections, and Bye-Pass.
Two Batteries of Vertical Atmospheric Cast-Iron CONDENSERS, each 36 ft. 6 in. by 6 ft. 10 in. by 21 ft. 3 in. high; 6-inch Tar and Liquor Overflow, 18-inch diameter Connections, Valves, and Bye-Pass.
One Horizontal STEAM-ENGINE, 10-inch bore, 20-inch stroke. Fly Wheel 5 ft. 6 in. diameter.
Two Vertical ENGINES and Reciprocating EXHAUSTERS, with Automatic Governor, and 12-inch diameter Gas Connections.
Further Particulars may be obtained, and the plant inspected, on application to Mr. J. Wilkinson, F.C.S., Engineer, Gas-Works, Halifax.
Tenders, endorsed "Disused Plant," must be sent to to the undersigned not later than twelve o'clock noon on Wednesday, the 29th of March, 1905.
The Committee do not bind themselves to accept the highest or any Tender.
By order,
Keighley Walton,
Town Clerk.

THE Haworth Urban District Council are prepared to receive TENDERS for the purchase of their surplus TAR and LIQUOR during the Year ending March 31, 1906.
Tenders, marked "Tar and Liquor," to be sent to me not later than the 29th of March.
William Robertshaw,
Clerk.
North Street, Keighley.

WOKING DISTRICT GAS COMPANY.

TENDERS are required for Excavating GROUND and CONSTRUCTING CONCRETE FOUNDATIONS for Gasholder together with Sheet Piling around the Foundation.
Drawings and Specification may be seen at the Office of the Engineer, Mr. Arthur Valon, 140, Temple Chambers, London, E.C.
Tenders to be sent in on or before April 1, addressed to
B. Dennett Holroyd,
Secretary.
5 & 6, Great Winchester Street,
Old Broad Street, E.C.

HINDLEY URBAN DISTRICT COUNCIL.

THE Gas Committee are prepared to receive TENDERS for new Annular CONDENSERS.
Copies of Plans and Specifications may be obtained from the undersigned on payment of One Guinea, which will be returned on receipt of *bonâ-fide* Tender.
Sealed Tenders, endorsed "Condensers," to be sent to Mr. T. Robey, Clerk to the Council, not later than Friday, the 31st of March, 1905.
The lowest or any Tender not necessarily accepted.
H. O. Timmins,
Engineer.
Gas-Works, Hindley,
March 10, 1905.

COUNTY BOROUGH OF SALFORD.
(Gas Department.)

THE Gas Committee invite Tenders for the supply of about 300 yards of 18-inch CAST-IRON PIPES.
Full Particulars may be obtained on application to Mr. Wm. W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Pipes," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 30th of March, 1905.
L. C. Evans,
Town Clerk.
Town Hall, Salford,
March 18, 1905.

COKE.

THE Directors of the Wandsworth and Putney Gas Company invite TENDERS for the removal of about 6000 Tons of "Wandsworth" COKE from these Works between April 1 and Sept. 30, 1905.
The Coke to be removed by Van or by Barge (free waterway on River Thames).
Sealed Tenders, endorsed "Tender for Coke," to be delivered here not later than March 24 inst.
The Directors reserve to themselves the right to accept any Tender in part or in whole, and do not bind themselves to accept the highest or any Tender.
Any further Information may be obtained from the Engineer, Mr. H. O. Carr.
C. W. Braine,
Secretary.
Wandsworth and Putney Gas Company,
North Street, Wandsworth, S.W., March 8.

THE
ROTARY STATION GAS-METER

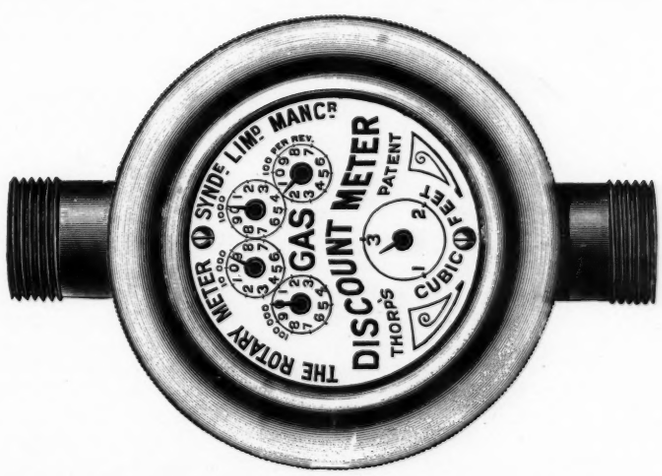
FOR MEASUREMENT OF COAL GAS, WATER GAS, PRODUCER GAS, MOND GAS, COKE-OVEN GAS, and AIR.

Occupies only One-Tenth the space of an Ordinary Gas-Meter.

Fullest Particulars on Application to

THOMAS G. MARSH,
ROTARY METER SYNDICATE, Ltd.
1, MAWSON CHAMBERS,
28, DEANSGATE,
MANCHESTER.

The ROTARY DISCOUNT METER.



For Particulars, apply to

THOMAS G. MARSH,
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Printed for Walter King by King, Sell, & Olding, Ltd.; and published by him at 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, March 21, 1905.

BRIDGEWATER COLLIERIES COKE-WORKS.

(THE EARL OF ELLESMERE.)

TENDERS are invited for the Light OIL produced at the above Works for a period of Six or Twelve Months from the 1st of May, 1905, delivered into Contractor's Tanks at the Bridgewater Colliery Siding, Wharton Hall, on the Pendleton and Hindley Branch of the Lancashire and Yorkshire Railway; or at the Brackley Siding on the Little Hulton Mineral Branch of the L. and N.W. Railway.

Tenders, endorsed "Tender for Light Oil," to be addressed to MR. THOMAS M. BROWN, Bridgewater Coal Office, 4, Chapel Walks, MANCHESTER, on or before the 3rd of April, 1905.

Manchester, March 14, 1905.

TO CHEMICAL MANUFACTURERS.

THE Corporation of Birkenhead are prepared to receive TENDERS for the purchase and removal of about 200 Tons of SPENT OXIDE OF IRON, and also for the purchase and removal of about 50 Tons of GAS CARBON, now lying at the Gas-Works.

Forms of Tender and Samples may be obtained from Mr. T. O. Paterson, Gas Engineer, Gas-Works, Thomas Street.

Tenders, sealed and endorsed "Tender for Spent Oxide of Iron" (or "Gas Carbon," as the case may be), to be sent in to me not later than Five p.m. on Thursday, the 23rd of March.

The Corporation do not bind themselves to accept the highest or any Tender.

By order,
ALFRED GILL,
Town Clerk.

Town Hall, Birkenhead,
March 14, 1905.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 29th inst., at Twelve o'clock precisely, to transact the usual Business, to declare the Dividend for the Half Year ended the 31st of December last, and to consider the question of increasing the remuneration of the Directors.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 18th and RE-OPENED on the 30th inst.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 9, 1905.

SOUTH METROPOLITAN GAS COMPANY.

SALE BY TENDER OF £67,300 PERPETUAL THREE PER CENT. DEBENTURE STOCK.

MINIMUM PRICE £90 PER CENT.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL BY TENDER £67,300 PERPETUAL THREE PER CENT. DEBENTURE STOCK, in accordance with the provisions of the "South Metropolitan Gas Act, 1901."

Particulars of same, with Form of Tender, can be obtained at this Office, on application to the undersigned, and Tenders must be sent in on or before Tuesday, the 28th day of March inst.

The Stock will be allotted to the highest bidders; but no Tender will be accepted at a lower price than at the rate of £90 money for each £100 Debenture Stock.

By order,
FRANK BUSH,
Secretary.

Offices: 709, Old Kent Road,
London, S.E., March 9, 1905.

To Trustees and Others.

HOOKER and WEBB have received Instructions to SELL BY AUCTION, at the Mart, Tokenhouse Yard, E.C., on Monday, the 3rd of April, at Two o'clock precisely, in 164 Lots,

£15,000 FOUR PER CENT. PERPETUAL DEBENTURE STOCK

of the Croydon Gas Company. The Reserve and Insurance Funds of the Company at Christmas last amounted to £44,994 2s. 1d.; the paid-up Ordinary Capital at that date was £310,000, whereas the Debenture Stock now amounts to only £55,000,—thus showing that the Stock offered is a security of the highest class.

Particulars and Conditions of Sale may be had of the SECRETARY, at the Offices of the Company, Katharine Street, CROYDON; at the MART, E.C.; and of the AUCTIONEERS, 4, High Street, CROYDON.

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ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

SOUTH ESSEX WATER-WORKS COMPANY.

NEW ISSUE OF £15,000 FIVE PER CENT. PREFERENCE STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, April 11, at Two o'clock precisely, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

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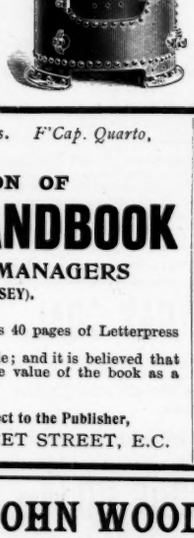

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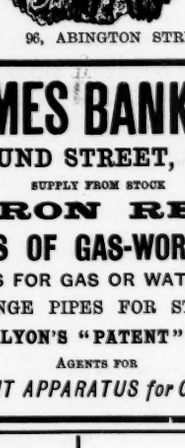

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[See Illustrated Advertisement, March 7, p. 618.]

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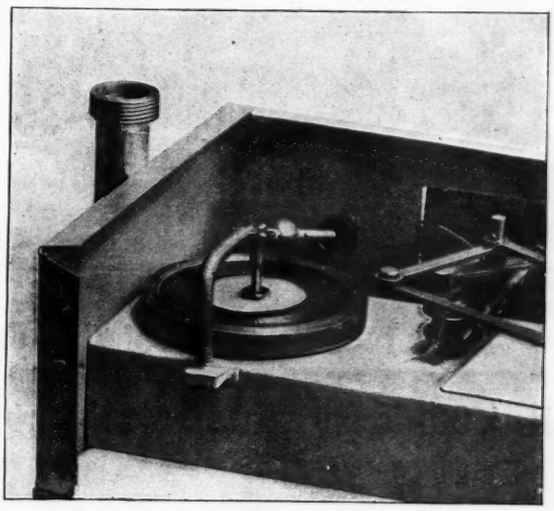

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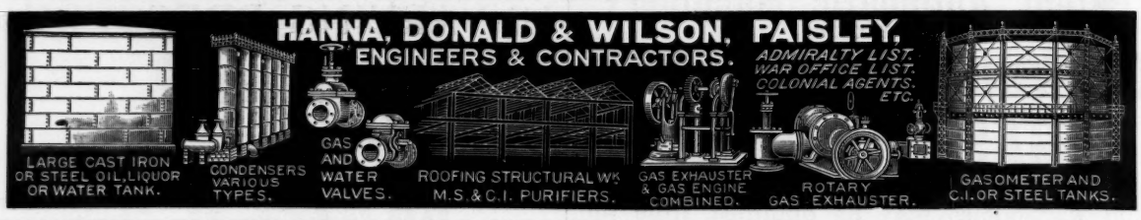
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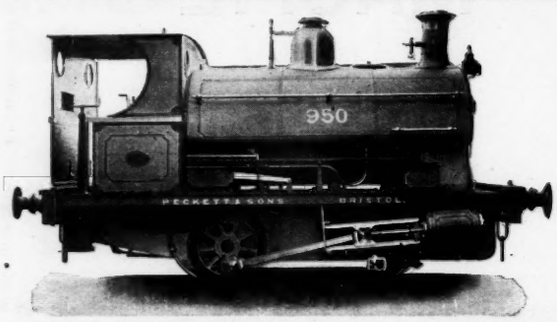

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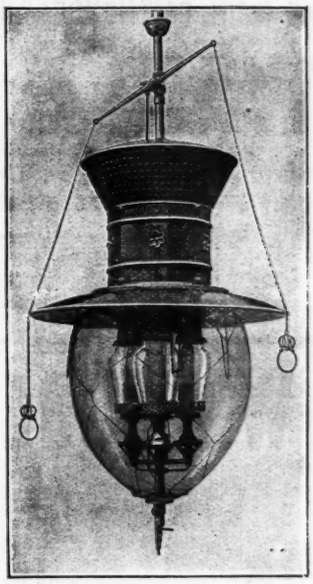

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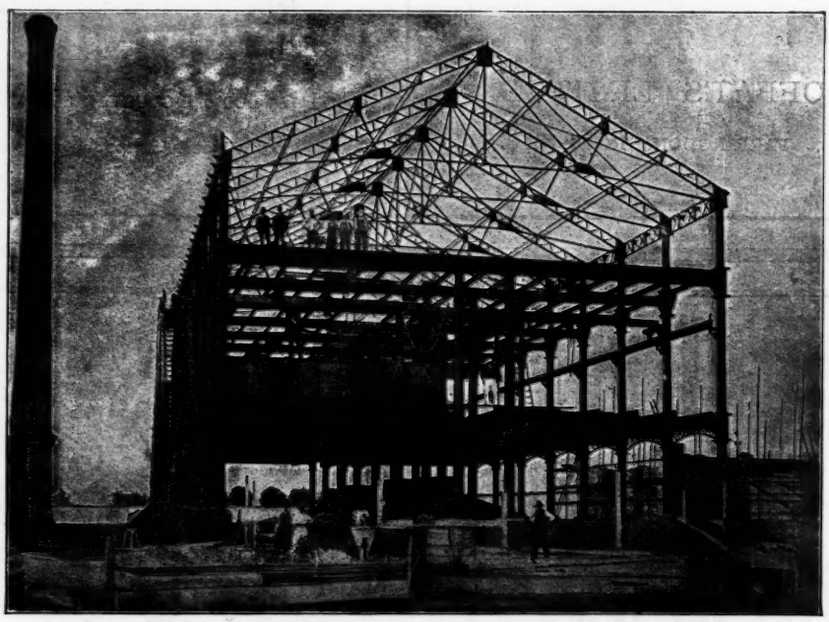

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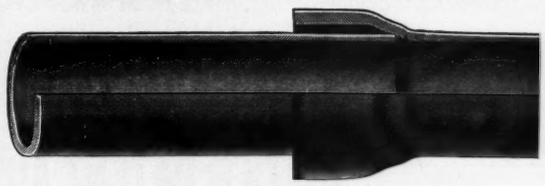

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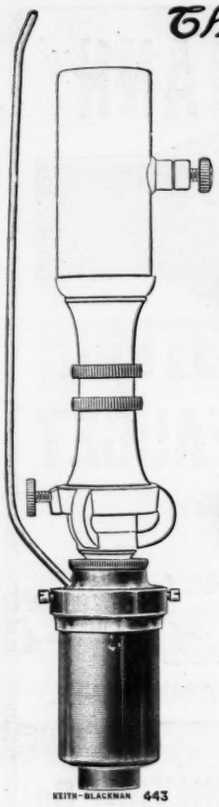

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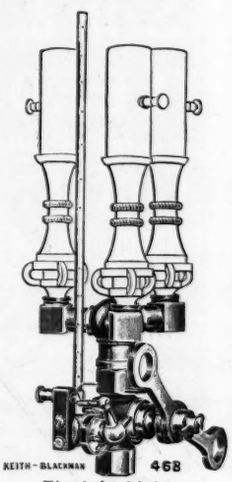

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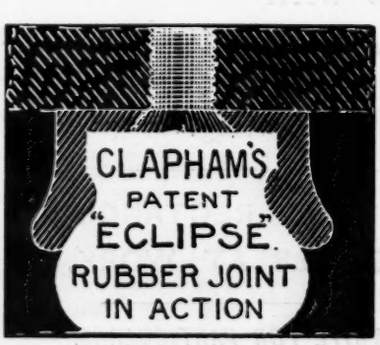

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